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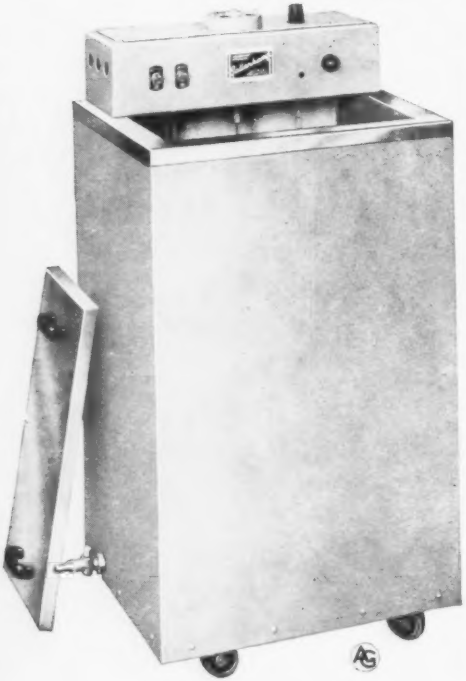

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INSTITUTE OF PETROLEUM REVIEW

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THE ANNUAL DINNER

This year's Annual Dinner of the Institute, held at Grosvenor House on March 6, under the chairmanship of the president, Mr C. A. P. Southwell, M.C., established a new record for attendance with over 700 present.

The guest of honour was Vice-Admiral Earl Mountbatten of Burma, K.G., P.C., G.C.S.I., G.C.I.E., G.C.V.O., K.C.B., D.S.O., (*Fourth Sea Lord*) who proposed the toast of "The Petroleum Industry." The toast of "The Guests," proposed by the president, was responded to by The Honourable Julius C. Holmes (*Minister Plenipotentiary of the United States of America*), and the toast of "The Institute of Petroleum" was proposed by The Honourable F. J. Hopwood (*managing director, Shell Petroleum Co. Ltd.*). The toast of "The Petroleum Industry" was replied to by Mr B. R. Jackson (*deputy-chairman, Anglo-Iranian Oil Co. Ltd.*).

Among the official guests present were: Major-General W. E. V. Abraham, C.B.E. (*The Burmah Oil Co. Ltd.*), Prof. E. D. Adrian, O.M. (*The Royal Society*), Prof. L. S. Bates, F.R.S. (*The Physical Society*), E. A. Berthoud, C.M.G. (*The Foreign Office*), Captain R. V. Brockman, R.N., Sir Andrew Bryan, J.P. (*The Institution of Mining Engineers*), V. S. Butler, C.M.G. (*Ministry of Fuel and Power*), R. A. Carder (*Esso Petroleum Co. Ltd.*), Prof. J. W. Cook, F.R.S. (*The Royal Institute of Chemistry*), Admiral of the Fleet Sir J. H. D. Cunningham, G.C.B., M.V.O. (*Iraq Petroleum Co. Ltd.*), Air Chief Marshal Sir William F. Dickson,

The President (right) and the guest of honour, Vice-Admiral Earl Mountbatten.

K.B.E., C.B., D.S.O., A.F.C. (*Air Member for Supply and Organization*), Dr S. F. Dorey, C.B.E., F.R.S. (*The Institution of Mechanical Engineers*), A. C. Dunningham (*The Institute of Fuel*), Lt.-Col. H. S. Ebben (*Manchester Oil Refinery Ltd.*), N. A. Gass (*Kuwait Oil Co. Ltd.*), Dr. W. H. Glanville, C.B.E. (*The Institution of Civil Engineers*), Sir Frederick Godber (*Shell Petroleum Co. Ltd.*), J. C. Gridley (*Vacuum Oil Co. Ltd.*), Sir A. Hearn, Col. L. C. Hill, D.S.O., M.C. (*The Institution of Mining and Metallurgy*), Sir Claud Hollis, G.C.M.G. (*Trinidad Petroleum Development Co. Ltd.*), E. F. E. Howard (*The Council of British Manufacturers of Petroleum Equipment*), Dr O. T. Jones, F.R.S. (*The Geological Society*), R. Kelf-Cohen, C.B. (*Ministry of Fuel and Power*), D. M. S. Langworthy (*Kuwait Oil Co. Ltd.*), Jonkheer O. C. A. van Lidth de Jeude (*President, 3rd World Petroleum Congress*), Rear-Admiral (E) F. T. Mason (*Deputy-Engineer-in-Chief of the Fleet*), Prof. D. M. Newitt, M.C., F.R.S. (*The Institution of Chemical Engineers*), Howard W. Page (*Esso Petroleum Co. Ltd.*), J. W. Platt (*Shell Petroleum Co. Ltd.*), Prof E. K. Rideal, M.B.E., F.R.S. (*The Chemical Society*), Dr H. Roxbee-Cox (*Ministry of Fuel and Power*), L. Sinclair (*Esso Petroleum Co. Ltd.*), General Sir G. Ivor Thomas, K.C.B., K.B.E., D.S.O., M.C. (*Quartermaster-General*), C. M. Vignoles (*Shell-Mex and B.P. Ltd.*), S. J. Vos (*Trinidad Leaseholds Ltd.*), Dr O. H. Wansborough-Jones, C.B., O.B.E. (*Ministry of Supply*), Sir Lawrence Watkinson, K.B.E., C.B., M.C. (*Ministry of Fuel and Power*), Prof. H. Weiss (*Association française des Techniciens du Pétrole*), Rodney E. Willoughby (*U.S.A. Petroleum Attaché*).

"THE PETROLEUM INDUSTRY"

Vice-Admiral Earl Mountbatten of Burma, K.G., P.C., G.C.S.I., G.C.I.E., G.C.V.O., K.C.B., D.S.O., said: It is a great honour to be asked to propose the toast of "The Petroleum Industry."

When your President invited me to speak to-night I felt some diffidence about it, because I am far from being an expert on oil and its derivatives. On the other hand, my present appointment in the Admiralty is Fourth Sea Lord and Chief of Supplies and Transport. As far as the Navy is concerned, all fuel oil and aviation spirit come under the heading of "supplies," and therefore I am responsible for them. So perhaps I have some excuse for being here to-night.

Prof. Henry Weiss (left) of the Association française des Techniciens du Pétrole, and Prof J. W. Cook, F.R.S., President of the Royal Institute of Chemistry.

I was also considerably heartened to find that at the First Annual Dinner of the Institute on March 25, 1919, the Fourth Sea Lord of the day, Rear-Admiral Sir Hugh Tothill, responded to the toast of the guests. I read through Admiral Tothill's speech a few days ago and I was struck by the very great changes which have taken place in so comparatively short a period of time.

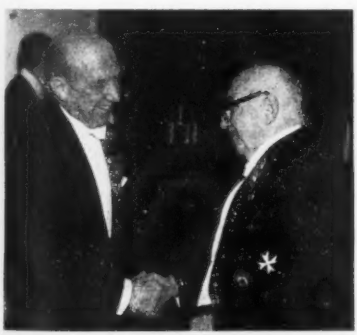
I have always thought that the story of the turn-over of the Navy from coal to oil fuel on a large scale is a fascinating one. It was in 1911 that Mr Winston Churchill first became First Lord of the Admiralty, and it was during his period of nearly four years in office that the large scale change-over took place. In his "World Crisis" there is a graphic description of how the fast division of battleships (the *Queen Elizabeth* Class) was created. Before that time the fast big warships were lightly-armoured battle cruisers and the evolution of a fast heavily-armoured battleship division was something quite new. The decision to introduce the 15-inch gun was a big step forward from the 13.5-inch guns of earlier classes; since from eight 15-inch guns in twin turrets a heavier broadside could be fired than from the existing ten 13.5-inch guns. It was thus possible for the centre twin turret to be omitted in the new design, making room for additional boilers in the *Queen Elizabeth* Class in order to give the higher speed desired. Even so, the power required for 25 knots in a battleship could only be produced by oil fuel. And so a decision was taken to create naval oil reserves and to go ahead in the future with oil fuel as the means of propulsion in the Navy. Its advantages were obvious—higher speed, a 40 per cent greater radius of action, ton for ton, and a greatly simplified firing and refuelling problem.

The Honourable Julius C. Holmes, U.S. Minister, and the Honourable F. J. Hopwood.

I have a close personal interest in this matter because my father was the First Sea Lord at that time and was associated intimately with the First Lord in this policy. Only the other day I saw the Admiralty copy of the original agreement with the Anglo-Persian Oil Company of May 20 1914, on which the signatures of Mr Churchill and my father appear together.

Coaling Ship

I wonder if anyone who has not coaled ship can have any idea what a tremendous operation it was during World War I. In 1916 I was serving as a sixteen-year-old midshipman in Beatty's famous flagship, the *Lion*. When coaling ship every member of the ship's company from the Commander down to the youngest midshipman and ship's boy took part. We had a specially good



The president greets Jonkheer O. C. A. van Lidth de Jeude, president of the Third World Petroleum Congress.

collier, the *Agnes Duncan*, permanently attached to the *Lion* and prided ourselves on holding the record for both the Battle Cruiser Fleet and the Grand Fleet with an average of over 400 tons an hour. I used to work in the foretopman's hold under Lord Westmorland, and we always used to get well over 100 tons an hour out of our one hold. While coaling ship nobody attempted to wash; the food we ate was covered with coal dust, and we slept in our grimed clothes during the short periods of rest. Those were the days before the black-out, and coaling would go on all night by the light of yard arm groups.

There is no doubt that coaling ship was a wonderful morale builder. We had 42 boilers in the *Lion* and no less than 600 stokers of the tough old type, and coaling ship did us all a lot of good. On the other hand, no sensible person could possibly wish to go back to coal-burning ships, for the advantages of oil are so enormous that they must outweigh any morale benefits from coaling ship.

All of us are so used to oil in its various forms now-a-days that we are inclined to forget how recently it appeared upon the world scene. The first well was not started in Pennsylvania until 1858 and it was almost a year later, on October 27, 1859, that oil was struck by Col. Drake at a depth of 69 feet. I mention the depth in particular because I think it is worth comparing with the 20,521 feet of the world's deepest well in Wyoming.

In 1913 petroleum provided about one-twentieth of the world's energy; now it provides nearly a third. Practically all the new energy needed for the great industrial and trade expansion of this machine age has come from petroleum. It has made possible many new inventions, notably the internal combustion engine and all that that means. Without it we would never have been able to fly. Oil is now indispensable in some form in every part of the globe, in every home, in every industry, on land, at sea, and in the air. It is directly responsible for much of the improvement of the world's standard of living. To have brought this revolution about in such a short time has been a tremendous task. It has called for great enterprise, ingenuity, invention, and research. It has embraced most of the sciences and translated their theory into practice. But the petroleum industry has proved itself equal to the task.

Tankers in War

Among the interesting sidelines to the job of Fourth Sea Lord is that of managing the third biggest tanker fleet under the British Flag; for the Admiralty-owned tanker tonnage at present is nearly half a million dead weight tons. In this connexion I would like to pay tribute to some of the exploits of the tankers at sea during the last war. I wish to acknowledge the value of the work carried out, not only by the tankers, but by the 150 escort oilers with the fleet who carried out these duties often in very hazardous circumstances at sea.

Two of the many classic cases of heroism and endurance are those of the tankers *Ohio* and *Ondina*. In the summer of 1942 the *Ohio* was in one of the vital convoys which were fought through from Gibraltar to Malta. This particular convoy was subjected to heavy and continuous attacks by enemy submarines and aircraft. The *Ohio* was torpedoed; she caught fire; the gyro and standard compasses were both put out of action; near misses buckled her bow; a bomb explosion tore a hole aft in her hull and carried away her rudder. At one period in the successive engagements she had a crashed German aircraft on her foredeck and another one in flames on her poop deck. In spite of all these attacks over a period of three days she finally made the Grand Harbour, Valetta, with only 2ft 6 inches

freeboard. I am glad to say that the outstanding display of courage by her ship's company was recognized by the award of the George Cross to her Master, Captain Mason. I am gratified to think that one of my nephews, the young Marquess of Milford Haven, was temporarily in command of the destroyer *Bramham* which actually brought the oiler into Malta.

Later on in the same year, the Dutch Motor Vessel *Ondina*, escorted by His Majesty's Indian Ship *Bengal*, was attacked by two Japanese raiders in the Indian Ocean. Remarkably accurate gunnery by the *Ondina* and *Bengal* resulted in the sinking of one of the raiders. Although the second raider sank the *Bengal* and crippled the *Ondina* to such an extent that her crew abandoned ship, the latter were able later to return to their vessel and eventually brought her safely to Australia.

I feel I must also refer to the remarkable conversions which were effected in 1943 on certain tankers in producing what were known as Macships (Merchant Aircraft Carrier ships). Ten tankers were converted in this way, thus enabling aircraft to be flown for the defence of convoys and yet for the ships to continue to carry almost their original quantity of oil fuel.

When I became Chief of Combined Operations at the end of 1941 one of my earliest contacts was with the Petroleum Warfare Department. At that time they had been unable to persuade any of the three Service Ministries to order flame throwers. I immediately placed orders on behalf of the Combined Operations Command so that they were in fact in production and available when the Service Ministries required them ater on.

PLUTO Development

Combined Operations Headquarters were responsible for advising not only on the technique of the assault against a defended coastline but also on the maintenance of the invasion forces across the beaches. So it became necessary very early on in our investigations to solve the problem of the supply of P.O.L. under these conditions. The War Office proposed to bring over petrol in non-returnable tins. But we found that they were so easily damaged in transit and so apt to leak in the holds of the cargo ships that were to bring them over, that there was grave risk of fire and explosion, particularly under active service conditions.

So the first thing my Headquarters had to try to do was to persuade the War Office to go in for Jerricans in a big way. These excellent containers invented by the Germans were strong enough to avoid all risk of damage. Since they were returnable it was necessary to set up oil tanks ashore, which we intended to feed from floating pipelines. The end of the pipeline was to be taken inboard by each tanker in turn so that the fuel could be piped straight into the tanks, and thence fill up the jerricans, which were being returned empty. The next idea was to move the fuel supply forward behind the advancing troops by means of rapidly laid pipelines. Our final idea of continuing the pipelines back across the channel to England was only a natural extension of the whole scheme of supply by pipeline. This scheme of Pipe Lines Under The Ocean was known by the initial letters of this phrase as PLUTO.

Pipelines in Burma

In Burma I was faced with a dual problem, not only to get petrol to the Army and Air Force, but also in accordance with my directive to push through supplies to China. I do not know anyone who has not served in South-east Asia who really does appreciate the magnitude of the pipeline system constructed in that area. The United States engineers ran a 6-inch line from Calcutta to North East Burma, two

4-inch lines from there down to Central Burma, and one 4-inch line onwards to Kunming, in China. They also laid a 6-inch line from Chittagong to the central front; parallel to which was a 4-inch British pipeline with an extension down to the forward 14th Army lines at Tamu. A ship to shore line was installed to a deep sea anchorage west of Chittagong.

The total length of pipeline laid was some 5,000 miles. Details of these pipelines will be found in my "Report to the Combined Chiefs of Staff on the campaign in South East Asia," which was published by the Stationery Office last month. A great majority of the work was done by British and American engineers, but I always remember the close co-operation we obtained from civilian oil experts, to whom I pay tribute. Most of the labour was, of course, provided by the Indian Pioneer Battalions.

Probably the most unusual suggestion in connexion with pipelines was made to me by Mr Geoffrey Pyke, who had been on my staff in Combined Operations Headquarters and who wrote to me from there to South-east Asia. He maintained that even if General Stilwell built his great road through from Ledo via Bahmo to join with the old Burma Road into China the lorries would have to be filled almost entirely with the petrol that would be needed to enable them to do the round journey, leaving virtually no pay load. His suggestion was that we should lay a 24-inch pipeline instead of building a road and that this pipeline in addition to pumping up the petrol needed for the war in China would also carry long cylindrical containers. Into these containers, he claimed, everything for China could be packed; not only guns, ammunition, bombs, and food, but also dismantled parts of lorries and finally soldiers with an oxygen supply to keep them alive on the trip! You will realize that this suggestion was never put into practice, for it certainly would have hit the headlines if it had worked.

There is no doubt that the petroleum industry made a remarkable and outstanding contribution to our achievements during World War II, the co-operation between the industry and the Government being most marked. As far as Britain was concerned we never ran short of fuel at any time, although, of course, supplies had to be rationed. As regards operations at sea, in the field and in the air, I never heard of any being hampered for lack of fuel. I think this was a remarkable achievement and one which we in the Navy in particular have never failed to appreciate. I am glad to see here to-night Mr Montgomery, the able Admiralty official responsible, under the Director of Stores, for the supply of fuel for the fleet and I know he will endorse what I have said on this point.

World Oil Supplies

Since the war the pattern of world oil supplies has changed. The rapid growth of consumption in North America, particularly in the United States, now accounting for nearly 60 per cent of the world consumption, has more and more absorbed the available production in the Western Hemisphere. The result of this is that the Eastern Hemisphere, and Western Europe in particular, is now deriving its supplies predominantly from the Middle East.

The development of Middle East crude oil production necessitated a parallel development of refinery facilities. Considerations of balance of trade payments has tended, in many countries, to favour the importation of their petroleum requirements in the form of crude oil rather than finished products because of the lower crude import value. Developments in transportation facilities have encouraged the building of refineries near the centres of consumption.

The large and continually-growing consumption of Europe, and the extent to which this is met from Middle East sources, has given rise to new transportation problems. Long distance, large diameter pipelines from the Persian Gulf to the Eastern Mediterranean are being laid in order to reduce the high cost involved in shipments by tankers via the Suez Canal. These large pipelines are essentially crude oil carriers. But crude oil is now also being carried in very large tankers of up to 30,000 tons capacity, which are well suited to the carriage of a single quality cargo to a single port of destination.

With the ever increasing speed of turn-round, many of these tankers will spend less than 24 hours in port. The question of amenities for the crews will thus become of cardinal importance. Will we end up by finding married quarters provided on board these ships? If so the traditional pipe of Nelson's days "show a leg, show a leg" may be heard again when the hands are being called at 5.40 a.m. You will remember that if a great hairy leg was stuck out of the hammock in response to this pipe, the owner was unceremoniously bundled out. But if it was a smooth and shapely leg it would be stroked and carefully tucked in again!

Anglo-American Agreement

I am surprised that greater public recognition has not been accorded to one of the latest major achievements in Anglo-American co-operation. The oil agreement signed the other day between the British Government and American owned companies show that the international oil industry is alive to its highest responsibilities. It is an agreement based on recognition of mutual interest and advantage. For Britain it will mean, I understand, a saving of some 150 million dollars a year, and the consolidation of our oil economy by the speeding up of our vast refinery programme, already far advanced towards completion. This is economic statesmanship of a high order which will help to free the flow of oil throughout the world.

Naval Fuel Problems

The advances which have been made in recent years in refinery techniques have brought problems to us in regard to the heavier fractions used so much in the Royal Navy for fuel oil. The fuel oil we are now getting in the Navy is not of the same specification as that which we enjoyed before the war. One of its disadvantages is that what were once the virgin wooden quarter decks of His Majesty's Ships are now spotted with a brown deposit, which it is almost impossible to clean off. A further adverse quality of the fuel oil available to the Navy at the present time is its tendency to become difficult to handle at low temperatures. This is forcing us to heat oil fuel storage and pipelines on a very big scale. This problem is now being tackled energetically and I am glad to say that we are receiving full co-operation from the industry.

At the present time we have an Admiralty Oil Quality Committee in being, presided over by the Hon. Ross Geddes, and including Professor F. H. Garner, a past-president of the Institute of Petroleum. Among other things, this Committee is to draw up a specification for furnace oil suitable for the Fleet and giving the maximum availability. They are also to recommend the measures which the Admiralty should take to ensure that ships receive fuels and lubricants of the correct standard of quality. Finally, they are to advise whether or not a permanent body should be set up to advise the Admiralty on oil quality problems affecting the Navy. I feel I ought to say how much we appreciate the very valuable assistance given on this Committee by those representing the oil industry.

The Committee have had their lighter moments, as I understand during their recent visit to H.M.S. *Vanguard* in the Mediterranean, Mr Geddes discovered that Naval Officers are rather better at contract bridge than he expected.

I am now coming to the end of what I have to say, and shortly Mr Jackson will be replying to the toast I am proposing. Mr Jackson is deputy-chairman of the Anglo-Iranian Oil Company. His father, Sir Henry Jackson, was Governor of Trinidad, an oil-producing colony with which many members of the British oil industry have been connected. His two brothers followed in the steps of their father; one recently retired as Governor of Tanganyika, and another brother I recently met in Cyprus where he is the Chief Justice. Mr Jackson has spent the whole of his oil career with the Anglo-Iranian Company; a considerable part of this time has been spent in America as their representative in that country. In short, he is unquestionably far better qualified to propose the toast of the Petroleum Industry than I am.

Nevertheless, since the privilege has been accorded to me, I now have much pleasure in proposing the Toast of The Petroleum Industry.

Mr B. R. Jackson responded. He said: You have just heard from Admiral Lord Mountbatten a speech wide in its scope, fascinating in its reminiscences of the war, and also promising and encouraging to us for the future (hear, hear). I would like to thank you, Lord Mountbatten, not only for what you have said, but also for the way in which you have said it.

I would like to thank you particularly for the terms in which you referred to the officers and men of the tanker fleet. If I may say so with all humility, I think they have acquired something of the tradition of the Royal Navy in regard to their silence, and it is well and good indeed that someone of Lord Mountbatten's standing who is in a position to judge, can speak of their merit and their heroic conduct during the war.

The whole industry, Mr President, which your Institute represents in Britain, is one in which most of the people here this evening have spent much of their working lives, and it has become a key industry of the world. Its products, ever expanding under the impetus of engineering ingenuity and chemical science, contribute something in some manner to almost every aspect of civilized life. It is a truism to say that if its major products were suddenly withdrawn, the wheel and the propellers of science and of commerce would stop. But I wonder whether you have ever thought—no doubt you have—that this industry has yet to celebrate its centenary. As Lord Mountbatten has pointed out, 1859 is generally accounted the year of its birth; it was in that year that the first successful well was drilled in Pennsylvania. In the meantime it has become one of the most important elements in foreign and international trade. It is worth now over £1,000 million annually.

Developments Since 1900

It seems to me, therefore, that we shall not be amiss if we consider the progress of oil since 1900, the turn of the century. I do not intend to be exhaustive, but let us consider some salient features of the oil industry. To do so is perhaps a somewhat unusual practice, because the oil industry always looks ahead; whether that is due to a natural optimism or ebullience I do not know, or whether it is due to the shortness of our history; I leave you to decide. In 1900, production amounted to 20 million tons a year, or 400,000 barrels a day, just about the output which the oil industry is preparing to refine in Britain. Russia and America contributed most of that. Curiously enough, production in the Far East was just beginning to be heard of, in the Middle East it was unknown, and

in Canada it was hardly thought of—it is an interesting sidelight on modern development.

In 1950, world production was 500 million tons a year, or 10 million barrels a day, with America easily in the lead. I think America provided 270 million tons, and the Middle East and the Caribbean were neck and neck, one at 88 and the other at 86 million tons. The rest were nowhere. I think Russia produced somewhere about 37 million tons.

In 1900 opinion was still divided as to the organic or inorganic theories of the origin of petroleum. I think the opinion now is heavily on the side of the organic theory. But it is in refining and research that the biggest change has become apparent. Refining was a simple distillation, but with experiment and cracking patents pointing the way to developments to come.

I think it was as late as 1916, as we have found in one of our trusted text books, that manufacturers came to the conclusion that research did not pay—a rather serious conclusion ! I am glad there were some people who were wiser in their generation than that.

I would like to contrast all this with the picture to-day; the modern refinery with its complicated equations of temperature, pressure, and chemical reaction, backed by research organizations second to none, striving to improve experience by experiment. In the field of transportation we have the same metamorphosis. The barrel, which had already been replaced by pipelines on land and tankers at sea, is still with us to-day as a unit of measurement. But the total number of miles of pipeline in the United States in 1900 was about 18,000, and to-day it is about 153,000 miles, excluding gas lines. I should mention also the great pipeline which has been constructed, and to which Lord Mountbatten has already referred, from Arabia to the Persian Gulf and to the Mediterranean. It is 1,000 miles of 30-inch pipe, and represents a great achievement due to the enterprise of our American friends.

The number of tankers in 1900 was 155, the total deadweight tonnage being 550,000, the biggest tanker being of 8,700 tons. To-day there are more than 2000 tankers afloat, having a total deadweight tonnage of 37,500,000, and 32,000 tonners are being built.

I would mention another fact which is giving some of us rather seriously to think—80 per cent of the world's shipping is oil-fired. In the Eastern Hemisphere 75 per cent of the bunkers for that shipping comes from the Middle East. I think it was in 1882 that Admiral Lord Fisher predicted that oil would replace coal in the navies of the world. But in 1900 the navies of the world were still using coal.

Further analysis of the post war years would prove that the progress of the oil industry has been more accelerated than diminished, and although our industry is subject to as many checks and retreats as any other, I see no reason to believe that its usefulness to mankind and its overall growth will cease. There may be setbacks; nevertheless, I think it will go on.

In a gathering of this sort I do not think I can be accused of partisanship if I say we all believe that in the final analysis oil, which contributes so much to civilization, which is also a major source of energy, can be found wanting in respect of its service to mankind. We are all conscious of that, and I think our consciousness of it over-rides the competition in which we indulge freely amongst ourselves. That consciousness, that nothing but the best will do to serve humanity, is something which we always appreciate, and it is something which I am sure, Mr President, is the cause of your Institute and has brought it into being.

I thank you, Lord Mountbatten, for the way in which you have proposed this toast.

"THE INSTITUTE OF PETROLEUM"

The Honourable F. J. Hopwood, proposing "The Institute of Petroleum," said: I want to unburden myself at the outset and explain to you that it is through no fault of mine that it has fallen to my lot to address you to-night. The fault lies entirely with the President, Mr Southwell, who in the course of our friendship over a long period I have discovered has peculiar powers of arranging things as he wishes and of accomplishing what he sets out to do. That these things may form an odd and varied pattern is perhaps the reflection of a whimsical character, but I do not seek to pass judgment on this point. If you reflect for a moment on some of his accomplishments you will see what I have in mind.

I first met Mr Southwell in the late twenties, when he was oil adviser to the Governor of Trinidad. His reputation was much enhanced by his accomplishments there. I have heard it said that he succeeded in putting Trinidad on the map as an oil-producing country, but Trinidad happens to be the most fickle and unpredictable oil country in the world. In fact one might well describe it as feminine, since it defeats every logical process of deduction. Later he turned his attention to this, our own island. He succeeded in putting it also on the map as an oil-producing country, but carefully arranging to do it in such a way quantitatively as to be of no danger competitively with coal! Having had his fun in these two places, he betook himself to Kuwait, where he decided to do something big. Perhaps he felt that time was running on, and on this occasion he established there a field which potentially is an all-time high in production capacity for any single field. But when I remind you that in his university days at Birmingham he won the title of *Victor Ludorum*, for a variety of athletic accomplishments, it is understandable that his disposition for fun and games should be maintained throughout his lifetime.

Be that as it may, the Institute is extremely fortunate in having him as their President.

But I really came to talk to you about the Institute of Petroleum. That is happily a pleasant subject, because it is associated with a live and progressive industry. I was thinking before I came here how miserable I would be if I had had to talk about the allied commodity of coal or one of the other much discussed commodities so often found to be in what is now euphemistically described as a condition of under delivery.

You are all well acquainted with the petroleum industry. You have also heard about it from the previous speakers. It is a contented industry because it is efficient, and underlying it is a great sense of service, the desire to give service to the public. This is demonstrated by the fact that the points at which the public ordinarily take delivery of their petrol have quite naturally become known all over the world as "service stations." It is efficient because efficiency is necessary if good service is to be given. It does not baulk at the word "service" or even "servant." It repudiates the idea often fostered in these times that people who receive service are the lowest form of animal life and that servants debase themselves to an even greater depth. I do not suppose it has ever occurred to Lord Mountbatten that he should be ashamed of being a member of one of the Services, let alone of the Senior Service—because in it there lies the pride of accomplishment.

The petroleum industry is, however, international and very competitive, and accordingly it is not easy or natural for the companies themselves to get together and work out all measures which might be of common benefit to the industry and consequently, by the enhancement of efficiency, be of benefit to the public also. It is therefore very

appropriate that there should be an industry body such as the Institute of Petroleum who can study these questions and make recommendations to the industry.

The American industry has a comparable body in the form of the A.P.I., which is very active. And so in 1913 the Institute was formed and Sir Boverton Redwood became the founder President. I was not in the industry at the time, but I was even then acquainted with Sir Boverton and I little thought that I would so many years later have this opportunity of paying a tribute to his work and memory (applause).

The Institute was then much smaller and was called the Institution of Petroleum Technologists. Its principal objectives were, if I have read correctly the more decorous language used in those days, first to make the petroleum industry more respectable and secondly to make it more efficient. The word used then was "proficient"—which is somewhat gentler.

The first objective was meritorious, although ambitious. Whether or not it has met with success I am not venturing to say. There seems to have been a retrograde step taken in 1938, when the Institution changed its name to the Institute of Petroleum and decided to broaden its membership to include "the economists, the financiers, the administrators, the executives, the distributors and the marketers." Nevertheless, I do believe that at the present time there are not more than one or two members of the industry who have served gaol sentences—I am now speaking internationally. As to the second objective, namely, to improve efficiency, there is no doubt that the Institute has been of considerable assistance. Right from the start the merit of contact and co-ordination was realized to the extent that the Institute went on record by adopting a motto to some such effect. It also adopted a crest. These intrigued me very much and I therefore decided to investigate their significance. After taking one look at the bird I realized that my studies in ornithology were of no avail. I eventually discovered that it was called an Archaeopterix and was the first creature to fly. It belongs to the Jurassic period; its main characteristics are a very large body and negligible brains! What application this has to the Institute of Petroleum I cannot possibly discern—especially as when the Institution was formed it was stated specifically that the aim would be to keep the body small and the mental qualification high.

With the motto I had more success. It is a Latin one and reads "Conjunctione Potiores." Having learnt some Latin at school I tried to translate it for myself and immediately got into difficulties. I remembered that the Latin word Conjunctio would refer to unity, and I knew that the Latin word "potio" meant a drink; and having had some experience of the oil fraternity I immediately jumped to the conclusion that alcohol was the bond, but on this I have been severely corrected. There is apparently another "potio," this with a short "o," which refers to power, and I am told that the correct translation is "strength through unity."

It is a wise saying which has never been more appropriate than it is to-day. And in observing it there is great scope for the good work which the Institute has already done to be energetically continued. I am thinking particularly of the work on standardization, which has been excellent.

There are other opportunities, for example, in the educational sphere. A high standard of education for young technologists, of whom the industry in Britain is needing more and more, is very necessary. Then there is the sphere of what is called public relations. We are always being told that through the lack of this the public thinks much worse of the industry than they should, whereas, I understand, if public relations

work is carried out successfully the public will think much better of the industry than they should. I think that perhaps another direction in which the Institute might assist is with the Parliamentary committees. It is apt to help if Members of Parliament know what they are talking about; and there is a growing interest among them in the affairs of the oil industry.

And last, but not least, to maintain and foster our contacts with our friends across the Atlantic, where the heart of the oil industry beats, as well as in other countries abroad. The A.P.I. accord great help to visitors in getting insight into diverse problems on the industry there. Reciprocal treatment by the Institute here will, I am sure, always be greatly appreciated.

And so with all the opportunities and needs ahead of it, which I know will be pursued with enthusiasm and energy, it is with the greatest pleasure that I give you the toast of the Institute of Petroleum, coupled with the name of its President—Mr Southwell.

The President, in his response said: This is the first large gathering that the Institute of Petroleum has had since I was elected to the presidential chair, and I want all our members to know how much I appreciate the honour that you have done me. As has been mentioned, I have been engaged on an Arabian adventure for nearly five years. During that time I have worked with American and British colleagues; I have sat day by day between an American and a Britisher. To-night I cannot help thinking that that must have been what might be called a graduating period, and that we have now reached graduation day, because throughout the evening I have been sitting between an eminent American, representing his country here, and a famous sailor and statesman of our own country (applause).

On behalf of everyone here I want to thank Mr Hopwood for his excellent speech, for the delightful way in which he has proposed the toast of our Institute. I am afraid he was over generous with his remarks concerning myself. In the past this toast has very often been proposed by guests who have not possessed that intimate knowledge of our industry which Mr Hopwood has. He is versed not only in the financial and administrative sphere, but also in that wide range of problems of science, technology, and public relations which confronts a director of a large oil organization, international in character. We in the Institute will take heed of what Mr Hopwood has said, and has said with such pleasant humour (hear, hear).

I do not propose to burden our guests with the affairs of our Institute; I would like to, but I feel that this is not quite the place in which to do it. But I would say that we in this Institute, following along and trying to adjust ourselves to an ever growing industry, must do more for our younger men. That means that we may have to adjust our organization, our procedure, and that we have got to rope in more of our experts.

I would also like to mention in dispatches our small permanent staff, headed by our general secretary, Mr Hough. This small staff has turned out a volume and quality of work during this last year which would do credit to a much larger organization (applause).

"THE GUESTS"

The President: Now I have the great pleasure of proposing the toast of "Our Guests." We are very glad to have with us so distinguished a sailor and statesman as Lord Mountbatten. It is given to few to have the genius to command and to be able to qualify also as one of our finest statesmen. Public service is a cardinal virtue which Lord Mountbatten possesses to a very high degree; both in war and in peace he has stimulated that spirit of good human relations (applause).

I wish to welcome also a large number of other distinguished guests. We welcome Rear Admiral (E) F. T. Mason, Deputy Engineer-in-Chief of the Fleet. We welcome the Quartermaster-General of our Army, General Sir G. Ivor Thomas, and also Air Chief Marshall Sir William Dickson, the Air Member for Supply and Organization. It is not long ago that he left his Command in the Middle East, that cradle of civilization which, as we have already heard, is providing such a large proportion of the oil requirements of Europe.

We welcome a number of friends from that fourth great Service, the Civil Service. We are sorry that Sir Donald Fergusson was at the last moment prevented from coming along. We are glad, however, to welcome Mr R. Kelf-Cohen, and Mr V. S. Butler, Ministry of Fuel and Power. Some of us meet these gentlemen in their respective spheres, and sometimes we feel they are rather like Old Mother Hubbard; but we do know that the bone they give us, however small, is given with that spirit of fairness and justice which has for long characterized our Civil Service.

Then we are glad to welcome a number of distinguished scientists, the presidents of scientific and technological societies; we welcome particularly Professor Adrian, President of the Royal Society; with that Society our Institute has had a link through two of its founder members, the late Sir Thomas Holland and Lord Cadman, and we have a link to-day through a number of Fellows of the Society in our Institute. It has been said that the oil man is tough; but those Fellows of the Royal Society who are interested in our affairs certainly qualify for that adjective. When we recall that the late Sir Thomas Holland, who was President of our Institute and a Fellow of the Royal Society, when around the age of 70 years, was willing to tackle any mountain, any desert, or any jungle which his duties as a consulting geologist to two large oil organizations demanded, I feel quite sure that you, Professor Adrian, will agree with what I have said. We have a number of men of the same calibre who are following in his shoes.

Now I wish to welcome an old friend of our Institute from across the Channel. He is Professor Weiss, the President of the Association française des Techniciens du Pétrole. The last occasion on which he visited our Institute was in 1938 when he gave us a learned discourse on lubrication. A lot of water has passed under the bridge since that time, and we are glad to see him here in good form, despite the occupation difficulties that he had to face.

Another welcome friend from the other side of the Channel is Jonkheer O. C. A. van Lidth de Jeude, a celebrated Dutch engineer and President of the 3rd World Petroleum Congress which will be held in Holland in June. The Dutch know how to organize scientific congresses, and as hosts they take a lot of beating. We look forward to enjoying ourselves there with him, and we are sure the Congress will be a great success.

I recall that when I was in America last year, I visited one of the largest research stations there, and I was asked what was all this business about the congress in Holland; I was told that all the young men there were wanting to write papers, apparently so that they could go to Holland to see the bulbs!

Now I come to welcome our American friends, members and guests. Anglo-American friendship in the oil world is absolute and complete. Whether it be in the jungle or the desert, in the field or the refinery, there you will find British and Americans, that camaraderie of brothers known as the oil family. We are glad to have with us as a guest that eminent representative of that country the Honourable Julius Holmes. It was Mark Twain who said "With a common origin, a common language, a common

literature, a common religion, and common drinks; what more is needful to the cementing of two nations together in a permanent bond of brotherhood."

I ask you to drink to our guests, and I couple with that toast the name of the Hon. Julius C. Holmes, a great representative in London of a great people.

The Hon. Julius C. Holmes, on rising to respond, commented "there is nothing common about the drink we have had to-night; it is a very superior drink."

On behalf of your guests, Mr President, let me thank you for the excellent dinner, for the privilege of being here and for the opportunity of hearing what has been said.

You have spoken of the camaraderie of the Anglo-American friendship in the oilfields, in the jungle, and in the desert. I would take this opportunity to thank you, Sir, and the Institute, for some very fine expressions of friendship towards the United States. I would like to recall that the Redwood Medal, which commemorates the benevolent pioneer of the Institute, was awarded to David White of the United States Geological Service in 1934. This year the Cadman Memorial Lecture will be delivered for the second time by an American, this time Mr Robert E. Wilson; and Mr R. P. Russell of the Standard Oil Development Company was awarded the Cadman Medal in 1947.

When the suggestion was made to me by a member of our Embassy, before I was officially invited here, that I might attend and make a very short speech, he told me something about the Institute of Petroleum, and I remarked to him that I had no business to speak to a scientific and technical body of that character for I should not know what to say. He suggested that I should be something like Henry's dog. When I asked about Henry's dog I was told that it was quite a mongrel, and was taken to a dog show. When Henry was asked if he expected such a specimen to be awarded a prize, he replied that he did not, but he said "just think of the nice dogs he is going to meet."

Men in the petroleum industry may be of a different breed of dog from diplomatists, but they work at my trade all over the world. There is no other business endeavour more far flung and more far reaching, penetrating more into the lives of people of other nations, than yours. Lord Mountbatten has referred to what you did in supplying the sinews of war. He has indicated that the last war could not have been fought and could not have been won without your efforts in supplying the fuel for the ships, for the tanks, and for the aircraft: and that is true. But you also make a great contribution to the struggle in which we who are dedicated to certain principles of liberty, of freedom, and of justice are engaged. You are on the frontier, and I was proud to hear what your president said of how British and Americans co-operated to accomplish our aims in that direction.

The Middle East is an exposed area. It is the only place on the periphery of the Soviet Union where its frontier has not been extended; therefore the Middle East is exposed and is dangerous, and it includes those rich deposits of oil which you in your wisdom and enterprise are exploiting. The contribution which your industry makes in that part of the world, in support of the efforts of your governments to hold it, is of paramount importance. Not only do you contribute to the safe-guarding of these essential resources which may be needed if trouble comes, but you also make a very great contribution to the work of peace, to the work of economic development, and to the betterment of the people. You are digging the earth in those areas and developing their resources. What you do also changes the pattern of life of the people of those lands, their comfort, their economic structure and so on. Thus you make your contribution in time of peace.

There is no-where a greater opportunity than in those areas to work together. Even though between Britain and America there may be healthy and hard-fought competition, nevertheless when the ships go down we stand together. We do these things constantly because our potential enemies on the other side of the iron curtain are on the alert every hour to find a way to drive a wedge between us. How little do they understand how unimportant are some of the things they say.

There is one matter which perhaps I might mention in the presence of Lord Mountbatten, for it has to do with the command of ships. Do you know that the coxswain of the Oxford boat is a Yankee? I should not be surprised if we hear about that over the Moscow radio!

Mr Holmes concluded with a further expression of thanks to the Institute for the hospitality it had extended to its guests.

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COUNCIL COMMENTARY

The April meeting of Council was held on the 11th with the President in the Chair.

A report on the Petroleum Exhibition was made to Council. This exhibition which is to tour a number of Universities and technical colleges during the coming months was opened at the Imperial College of Science on April 5. It is a joint Shell-Anglo-Iranian effort and the Institute was asked to sponsor the opening ceremony. The President invited Sir Henry Tizard to declare the Exhibition open and this was done in the presence of about 300 members of the Institute. Tea was served and those present were able to have a preview of the Exhibition after the opening ceremony was concluded.

A new branch of the Institute is in the process of being formed in Kuwait with 40 members. It will be known as the Persian Gulf branch and the first chairman was active in the former Roumanian branch before this was dissolved. There will then be two oversea branches, the other being Trinidad.

The question of collaboration between the Institute and the A.S.T.M. on standardization matters was again discussed. An Ad-Hoc committee formed to study ways and means of achieving this end had recommended the formation of a "President's Committee" to deal with the best methods of collaborating with technical bodies from the U.S.A. and other countries. This was agreed, and the committee will consist of the President with Col S. J. M. Auld, G. H. Coxon, E. A. Evans, Prof F. H. Garner, H. Hyams, H. C. Tett, and S. C. Windebank.

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SYNTHESIS PLANT IN SOUTH AFRICA

Construction of a commercial gasoline-from-coal synthesis plant is soon to begin near the town of Coalbrook, Orange Free State, about 40 miles south of Johannesburg. The plant, said to be the largest industrial project to be undertaken in South Africa since the last war is being built for SASOL (South African Coal, Oil and Gas Corporation Ltd.). The M. W. Kellogg Company's Synthol Process is to be employed in the synthesis step.

Students from the Arab State of Kuwait now studying at various educational institutions in the United Kingdom, were the guests of the Kuwait Oil Company at a gathering held in London during February 23-25 to celebrate the first anniversary of the accession of the ruler of Kuwait, His Highness Shaikh Abdullah as-Salim as-Sabah. Arrangements for their entertainment included a visit to the Houses of Parliament, a League football match at the Queens Park Rangers ground at Shepherds Bush, and a luncheon party at the Royal Automobile Club's country house at Epsom (where the above photograph was taken) as the guests of the Kuwait Oil Company's managing director, Mr C. A. P. Southwell. The number of Kuwaiti students now in the United Kingdom is fourteen. Education, engineering, and medicine are among the subjects which they are studying.

PAKISTAN OIL SEARCH

The spudding-in of the first test well of Pakistan's first oil company—Pakistan Petroleum Ltd—was performed in the Patharia hills on March 13 by the Governor of East Pakistan, H.E. Malik Feroze Khan Noon. Speaking after the ceremony, the Governor surveyed the efforts of the Burmah Oil Company to find oil in the Patharia hills since 1917 and expressed appreciation of the speed with which the new company, an offshoot of the Burmah Oil Company, had erected their drilling rig in this area. He complimented the manager and his staff on their efforts to expedite the drilling operations and told the workers that the finding of oil would add to the wealth of Pakistan and that they should spare no effort in their work.

M. J. Condon, manager of the company, said that previously two wells had been drilled in the region, one of which produced some oil. It was hoped that the new well would be successful and he thanked the employees and the local administration for their co-operation.

WORLD PETROLEUM CONGRESS

A cocktail party was given on March 28 by the British members of the Permanent Council of the World Petroleum Congress, at the Savoy Hotel, London, in honour of their colleagues from other countries who had been attending a meeting of the Permanent Council that afternoon.

The foreign delegates on the Permanent Council present were: G. A. T. Schuitemaker (*chairman*), J. A. Beukers (*honorary treasurer*), J. W. Zwartsenberg (*honorary secretary*), P. de Ryckere (*Belgium*), J. Filhol and X. Normand (*France*), Prof Carlo Padovani (*Italy*), and Dr Carlos de la Cova (*Venezuela*).

Amongst the guests were Mr C. A. P. Southwell, president of the Institute of Petroleum, and other members of the Institute, together with directors and executives from the petroleum industry.

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Suppressors. All new petrol-engined vehicles for delivery to Shell-Mex and B.P. Ltd. are being fitted with suppressors in the ignition circuit to obviate interference with radio and television reception.

THE RISE AND FALL OF THE PETROL BUS

By A. T. WILFORD (Fellow)

On November 14, 1896—a historic date for motorists—a medley of mechanically-propelled vehicles set out from London to Brighton. Amongst the few to arrive was a motor-omnibus. In 1898, the Motor Traction Co. Ltd. purchased a German Daimler single-deck petrol bus and ran it between Notting Hill Gate and Oxford Circus. In the following year two British-built buses of Daimler design chassis, fitted with double-deck bodies of the horse-bus type, ran between Kennington and Victoria and in the next year, 1900, between Kennington and Oxford Circus. These two vehicles were the pioneers of the petrol buses which, within the next ten years, were to replace the horse buses and continue on the streets of London until the end of the half-century.

These early petrol buses were, however, far from being the first mechanically-propelled vehicles that had plied on fixed routes in London.

Early Mechanically-propelled Vehicles

The first bus to be seen in England was the famous Shillibeer "Omnibus," built and operated by George Shillibeer; it was drawn by three horses harnessed abreast and began working between Paddington and the Bank on July 4, 1829. A competing type of vehicle soon made its appearance, when in 1831, Walter Hancock's "Infant II" steam-carriage commenced plying between Whitechapel and Stratford. Further vehicles of the same type and bearing the names "Enterprise," "Era," "Erin," "Autopsy"—and "Automaton" were introduced between 1833 and 1835 and ran between the City and Paddington or on the Stratford road, for a few years. Other types of steam carriages came into service and in 1833 two of Scott Russell's vehicles were working to Windsor, Kew, and Greenwich. In 1841, the General Steam Carriage Co's vehicles were operating daily between Regents Park and Tottenham. It has been stated that many of these carriages were excellent mechanically and quite fast, but they do not appear to have been popular nor could they compete with the higher speeds offered by the railways which were being intensively developed in the 1840's.

Their owners also suffered from lack of capital and above all from obstructive and aggressive highway legislation. The Turnpike Act of 1840 imposed very heavy tolls on mechanically-propelled as compared with horse-drawn vehicles. The Locomotive Act of 1861 imposed speed limits of 10 miles an hour in the country and 5 miles an hour in towns. Four years later, the famous "Red Flag" Act, the Locomotive Act of 1865, reduced the speed limits to 4 miles an hour in the country and 2 miles an hour in towns and in addition required a man bearing a red flag to precede each vehicle.

It is interesting to speculate on what would have happened if the steam-carriage had been given full facilities for development. It is reasonable to assume that the vehicle would have attained a reliability comparable with that of the steam locomotive; seating capacity could have been increased and there is little doubt that the era of the horse bus would have been much shortened. The petrol engine would have had much more difficulty in establishing itself and, if a parallel can be drawn with the railways, might never have become established as a prime mover for public service vehicles. This situation might in turn have given an impetus to the earlier development of the high-speed oil-engine. But the Act of 1865 put an end to steam-driven buses. It remained in force until 1896

and by this time, the petrol engine was ten years old.

By 1900, therefore, petrol-driven buses were already being tried out on the London streets and a few had also appeared in the provinces. Their future was not as yet assured, for steam buses began to operate again (in 1902) while battery-operated electric buses also came on the scene. The horse bus too was at its peak; some 3,700 were operating in London in 1901 and carried 460,000,000 passengers.

Intensive Development

The period 1900-1908 was one of intensive development of the petrol-engined bus, and led to chaotic competition in London. During these years as many as thirty-seven different makes or types of chassis were placed on the roads, including French and German designs and one each of Belgian and U.S. origin, the last mentioned being a petrol-electric vehicle purchased by the London General Omnibus Co. Ltd. in 1903.

The London General Omnibus Co. Ltd., however, was very cautious in entering the new field, preferring to continue running its large fleet of horse buses until the petrol - driven vehicle had become more reliable. The frequent breakdowns, the sight of disabled motor buses parked at the kerbside and the ribald comments of the drivers of passing horse buses, are within the memory of many. By the middle of 1905, there were 73 motor buses running in London; these included 19 "Union Jack" (Road Car Co.), 16 "Vanguard" (London Motor Omnibus Co.) and 12 Thomas Tilling; of the remaining 26, only 4 were London General Omnibus Co. "Generals." By May 1906, the total had increased to 422 and in August of the next year had reached 861. By the end of 1907, the number of licensed motor omnibuses in London totalled 1,205. But this rapid growth was not maintained and during the next three years the number of motor buses on the roads was actually below the 1907 total.

The apparent setback was due to two causes. The pace of development and the cut-throat competition which accompanied it were beyond the financial resources of many of the operating concerns. The Vanguard Company who had already absorbed four smaller companies was itself absorbed, in 1908, by the L.G.O. Co., as also was the Road Car Co. The L.G.O. Co's own fleet of only 243 motor buses was thus increased to 839. Other enterprises

Early type L.G.O.C. petrol bus with horse bus body—1903.

were taken over soon afterwards and working agreements were entered into with Thomas Tilling and the few other motor omnibus concerns that survived. These amalgamations were one of the causes of the reduction in the numbers of motor buses running between 1908 and 1910. Another cause was the short life of these early vehicles and the wise decision to await replacing them until a more reliable type had been developed.

L.G.O.C. petrol bus ("Orion" type)—1904

The various makes of petrol bus on the roads during the development years included many names which remain well-known to-day. Reference has already been made to the Daimler single-decker running in 1898 and to the two double-deckers with British-built Daimler chassis that followed it; these latter vehicles were built by Brazil, Holborough, and Straker. A Scott-Stirling single-decker with a 12-h.p. two-cylinder engine appeared at the end of 1902; double-deckers of the same make had 14-h.p. or 24-h.p. engines. Other British makes included Milnes-Daimler, Wolseley, Leyland-Crossley, Dennis, Beaufort, Arrol-Johnson, Straker-Squire, Maudslay, Armstrong-Whitworth, and Hallford-Stevens, the last-mentioned being a petrol-electric vehicle. Of the Continental makes Bussing, de Dion and Durkopp were the most numerous.

Petrol Bus Established

The pause in the development of the motor bus did not last long and by the beginning of 1910, the Central concern were operating a new 35 h.p. Leyland vehicle and the Great Eastern, the Straker-Squire Y-type, the last chain-driven bus to be built for service in London. The steam bus also appeared again as the "National," with the Clarkson high-speed engine. The L.G.O. Co. were running the "X" type bus, the first of their own design and precursor of the famous "B" type, both of which were built by the Associated Equipment Co. In 1911, there were 1,962 licensed motor buses operating in London. On October 25 of that year, the last "General" horse bus made its final journey between London Bridge and Moorgate Street stations. This, and other horse bus services were taken over and worked for a time by another company.

The L.G.O. Co.'s "B" type bus, now thoroughly established, was a 34-seater vehicle; a single-deck model carried 16 passengers. The bus was powered by a four-cylinder engine with cast-iron pistons; the cylinder blocks were T-shaped with the valves disposed two on either side; maximum engine speed was 1,100

L.G.O.C. petrol bus ("STL" type)—1932

Copyright London Transport Executive

r.p.m. The majority of the engines were of 110-mm bore, developing 28 h.p.; a few were of 115-mm bore and developed 40 h.p. The "B" type bus is remembered not only for its reliability, but because of the use made of it by the British Expeditionary Force in the 1914-18 war. Some 1,300 of them were withdrawn from service and sent overseas; another 300 were engaged in defence work in the London area. During that period, restrictions in the supply of petrol led to experiments with coal gas, alcohol-benzole mixtures and other alternative fuels, but there was never any indication that these would replace petrol when supplies were freely available. The same remark applies to the experimental use of a methanol-creosote mixture in the 1930's and the conversion of some 300 petrol-engined vehicles to operate on producer gas during the 1939-45 war.

The end of the 1914-18 war left the L.G.O. Co. with a much depleted fleet and far below the requirements of the traffic to be handled. While the "B" types continued to operate satisfactorily —the last of them was not withdrawn from service until October 1927—a new 46-seater bus, the "K" type, was brought into operation in 1919. The engine, like that of the "B" type bus, was a four - cylinder model of 28 h.p., but reflected the progress in design that had taken place since 1910. It had an L-shaped head, the pistons were of aluminium alloy instead of cast iron, while maximum engine speed was increased to 1 500 r.p.m. Its compression ratio however, was a little lower than that of the "B" type engine, being 3.94 to 1 as against 4.13 to 1.

The same basic design was used in the "S" type bus, a 54-seater vehicle introduced in 1920, but the engine was of larger size, developing 35 h.p. at 1,000 r.p.m. and the compression ratio was increased to 4.15 to 1. This engine was retained for the "NS" bus first put into service in 1923 and converted to covered-top type from 1925 onwards.

The first six-cylinder engine was introduced in 1927. It was a side-valve model of 50 h.p. and was fitted to a six-wheeled pneumatic-tyred vehicle, the "LS" type.

A six-cylinder engine with overhead camshaft was put into service in 1929, being used in the six-wheeled, three-axle "LT" type bus and in the two-axle model, the "ST" type, which followed a year later. The engine was of A.E.C. manufacture, had a compression ratio of 5 to 1 (later increased to $5\frac{1}{4}$ to 1) and a maximum useful speed of 2,500 r.p.m.:

it was produced in two sizes, one of 37 h.p. and the other of 45 h.p. This six-cylinder overhead-valve engine was the most modern of the petrol types used by London Transport and in addition to being employed in the "LT" and "ST" type buses, it was also fitted to the first 250 of the "STL" series, introduced in 1932.

These few details about the types of engines employed by the L.G.O. Co. from 1910 onwards are perhaps sufficient to complete the story of the rise of the petrol bus. So far as London is concerned, it had reached its peak in 1932 for after that year practically all new engines put into service were of the compression-ignition type.

Service tests with compression-ignition engines had commenced in 1929, and in 1931, twenty-two six-wheeled double-deck buses were converted from petrol to oil-driven, the engines being of the A.E.C.-Acro type. Subsequently the A.E.C. - Ricardo engine was adopted. Much experimentation was necessary before the C.I. engine could be regarded as acceptable in respect of freedom from exhaust smoke, smoothness of running and general reliability, but these very real difficulties were eventually overcome.

As a power unit for buses, the compression-ignition engine possesses definite advantages over the petrol engine. There is a reduced risk of fire, the load-speed characteristics of the C.I. engine render it particularly suitable for use under heavy traffic conditions, while its higher thermal efficiency—34 per cent as against 23 per cent for a petrol engine of a type suitable for use in buses—leads to a substantial economy in fuel consumption. (The average fuel consumption of London Transport's petrol buses during 1949, when this fleet was still of a substantial size, was 5.07 miles per gallon; during the same year the C.I.-engined fleet yielded an average of 9.89 m.p.g.)

At the end of 1933, six months after the formation of the London Passenger Transport Board, the total fleet consisted of 5,700 buses and coaches of which 180 were fitted with C.I. engines. By 1939, only ten years after the first compression-ignition engined vehicle had been placed in service, this type constituted 65 per cent of the fleet and but for the intervention of the war all petrol-engined buses and coaches in normal service would have been replaced by oil-engined types by the end of 1943. The final demise of the petrol bus was, however, delayed until November 21, 1950, when the last of them was withdrawn from service.

Compared with the horse bus which ran on the streets of London for eighty-two years, the petrol bus has had the modest life of but fifty years and this is seven years longer than was anticipated in 1939. Its disappearance has been gradual and largely unnoticed and lacks the spectacular break with tradition that marked its introduction in the early years of the century. During its fifty years of life the petrol bus has given Londoners good service, but it is no use pretending that it leaves behind it the nostalgic feelings associated with the horse bus, with its high-perched, loquacious driver, its stage-coach appearance and link with Dickens and the "good old times." It is unlikely that history will record the passing of the petrol bus but it would be unkind to the early pioneers if it failed to mention the intensive efforts that led to its being established as a reliable and rapid mode of transport for all comers.

Acknowledgments

The author is indebted to the following publications for much of the information contained in this article :—

"One Hundred Years of the London Omnibus — 1829-1929". London General Omnibus Co. Ltd., 1929.

"The London Motor-Bus — 1896-1949" A. W. Kidner. The Oakham Press, 1950.

His thanks are also due to the London Transport Executive for permission to make use of records in their possession and to publish the three photographs.

PERSONAL NOTES

C. M. Merrick, M.Inst.Pet., managing director of Shell-Mex and B.P. since 1945, has retired. Joining the Asiatic Petroleum Company in 1924, he gained his early experience of the oil industry in Malaya. In 1947 Mr Merrick was elected chairman of the newly-formed U.K. Petroleum Industry Advisory Committee, and in 1949 he was appointed one of the industry's two representatives on the Oil Consumers' Council.

C. M. Vignoles, O.B.E., M.Inst.Pet., has been appointed managing director of Shell-Mex and B.P. in succession to C. M. Merrick. Mr Vignoles joined Royal Dutch-Shell in 1924 and served in the Far East during the early part of his career. He became a director of Shell-Mex and B.P. last November. Mr Vignoles has been elected chairman of the U.K. Petroleum Industry Advisory Committee in succession to Mr Merrick and has accepted an invitation from the Minister of Fuel and Power to be a representative of the oil industry on the Oil Consumers' Council.

J. W. MacMahon, M.Inst.Pet., has been appointed sales manager of the industrial oils department of C. C. Wakefield and Co. Ltd. Other new appointments in the industrial sales organization of that company are **B.S. Davis, D. S. Kirkpatrick,** and **J. E. S. Ewell** to be Eastern, Western, and Northern Regional sales managers respectively.

After nearly 28 years service with Shell, **I. Lubbock,** F.Inst.Pet., has retired. A pioneer in the turbo-jet field, he was associated as far back as 1938 with Sir Frank Whittle's experiments. Mr Lubbock was in charge of Shell's Fuel Oil Technical Department from 1926 to 1945. He then transferred to the Sales Technical Advisory department, taking over the Internal Combustion Turbine Section—an appointment he held up to the date of his retirement. Another field in which Mr Lubbock initiated fuel research was that of the marine and industrial gas turbine.

A. C. Hartley, C.B.E., F.Inst.Pet., a former member of Council and vice-president of the Institute of Petroleum, has been elected president of the Institution of Mechanical Engineers. Mr Hartley, who graduated in 1910, held a commission in the R.F.C. during the first world war. He joined Anglo-Persian in 1924, becoming assistant manager of the engineering department the following year. He went to Persia in 1926, and again in 1931, to deputize for the assistant general manager (technical). From 1932-4 he was seconded to Iraq Petroleum Co for the design and development of the Kirkuk-Mediterranean pipelines. Returning to Anglo-Iranian, he held the position of chief engineer until 1950, when he relinquished it to become consultant to the company. During the last war Mr Hartley worked with several govern-

ment and Services departments. He was associated with the development and production of a stabilized automatic bombsight, with the development, production and laying of PLUTO, and was in addition, technical director of the Petroleum Warfare Department dealing with the FIDO scheme and with flame weapon development.

John King, of Aberdeen, construction fitter with Shell-Mex and B.P. Ltd., has been awarded the British Empire Medal. The presentation of this honour to a number of recipients from the fuel and power industries, was made on behalf of H.M. the King by the Minister of Fuel and Power on April 6.

Donald Cameron Tewson has been appointed a director of the Kern Oil Co.

It is with regret that we record the death by accident in Australia of **Dr Arthur Wade,** F.Inst.Pet., who for many years was a Member of Council of the Institute. An appreciation of his services to the industry will appear in the Journal in due course.

W. Bruce Dick, a Founder Member of the Institute, passed away on April 16. He was for many years chairman of W. B. Dick & Co Ltd. An obituary will appear in the *Journal* in due course.

A. W. Rundle, of A. Gallenkamp & Co. Ltd., has been elected a member of the Executive Council of British Laboratory Ware Association Ltd.

Among the visitors to Great Britain during the period of the World Petroleum Congress will be **G. B. Shea,** who is in charge of the U.S. Bureau of Mines work on the Pacific Coast, and **Harold M. Smith,** who is in charge of petroleum chemistry and refining at the Petroleum Experiment Station, Bartlesville, Oklahoma.

W.P.C. OFFICIAL ADDRESS

Correspondence sent to members of the Third World Petroleum Congress, during the period of the Congress, May 28 to June 6, 1951, should be addressed as follows:—

(Name).....
Member of World Petroleum Congress,
Palace Hotel,
The Hague—Saheveningen,
Holland.

E. A. Evans, past president of the Institute, holding the camera presented to him by his colleagues on his retirement from the Wakefield Group of Companies, with whom he was chief chemist. On the right is Alonzo Limb, joint managing director, C. C. Wakefield & Co. Ltd.

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IRON AND STEEL ANALYSIS

The fourth edition of "Standard Methods of Analysis of Iron and Ferro-Alloys" has been published by The United Steel Companies, Ltd, Sheffield. Comprising more than 170 pages, the new edition, priced 17s 6d contains 42 new methods.

The major addition to the preceding volume is the section dealing with physico-chemical techniques, such as absorption and polarographic methods.

BIRMINGHAM STUDENTS DINE

The Chemical Engineering Plant Industry was the theme of this year's Annual Dinner of the Birmingham University Chemical Engineering Society and Student Section of the Institute of Petroleum, held on March 13. Consequently the guests of honour were E. F. E. Howard (*chairman, Council of British Manufacturers of Petroleum Equipment*) and Major V. F. Gloag, M.C. (*chairman, British Chemical Plant Manufacturers Association*). The Chair was taken by G. A. Lee (*chairman of the Society*).

Among those present were Sir Raymond Priestley (*vice-chancellor of the University*), Prof F. H. Garner, O.B.E., and Prof Frank Morton (*Department of Chemical Engineering*), C. A. P. Southwell, M.C. (*president, Institute of Petroleum*), J. Ronca, O.B.E. (*president, Institute of Fuel*), and a number of representatives of the chemical and petroleum industries.

"*The Chemical Engineering Plant Industry*"

Prof F. H. Garner, in proposing the toast of "The Chemical Engineering Plant Industry" said that it was in Birmingham that Dr Roebuck erected the first lead chambers for sulphuric acid manufacture in place of the large glass tubes used elsewhere. The change from the seen to the unseen, which was also the transition from the chemist to the chemical engineer, combined with an increase in manufacture, brought design problems connected with heat transfer, fluid flow, and pressure drop.

Plant design must be based on a knowledge of both materials and of methods of fabrication, said Prof Garner. There would certainly be a large expansion in the manufacture of chemical and petroleum engineering plant in the U.K. to meet our own and also export needs. There had been too much reliance in the past on processes and equipment developed overseas, largely due to the relatively small proportion of university-trained technologists and to some belief that a career in applied science was inferior in status to other professions. As Sir Ewart Smith had said: "It may well be said that this country spends much effort in research for others to reap the effetive benefit in application."

Coupling the names of Major Gloag and Mr Howard with the toast, Prof Garner said that the B.C.P.M.A., which Major Gloag represented, had done a great deal to foster chemical engineering education in the U.K. and he hoped the Association would later produce cost figures on plant design which would put Britain in a similar position to the U.S.A., where such data are readily available. Mr Howard was an old friend of the Department and had been responsible for gifts of cross-sectioned pumps of great value to the teaching classes.

Mr E. F. E. Howard, responding to the toast, said he felt that it was a happy augury that the names of Major Gloag and himself, and hence the associations they represented, had been coupled with the toast. It indicated the awaredness of the Society of the increasing degree of collaboration taking place between the chemical and the petroleum industries, who daily handled similar problems using similar plant and equipment.

The plant and the equipment were designed and made to meet the needs and requirements of the chemical engineer. By providing universities and technological institutions with suitable equipment manufacturers could therefore play their part. Thanks to the interest taken in this matter by the Institute of Petroleum something had already been done in this respect and hopes ran high that much more would be done.

Major V. F. Gloag, M.C., also replying to the toast, said that to-day a design chemical engineer needed to have a thorough grounding in theory and its practical application, and had to be a leader of men, a leader in science, and often a leader in finance. Chemical engineering was a science of its own and in fact was almost an exact science, but it could only be applied through practical experience.

Birmingham, said Major Gloag, had a fine reputation for producing chemical engineers and he wished to impress on the students that there were more prizes to be won in the chemical engineering world than probably in any other sphere. However, it meant hard work and application.

"*The Society*"

Mr C. A. P. Southwell, M.C. (*president of the Institute of Petroleum*) proposing the toast of "The Society" said that it had been a far-seeing and courageous act to transform the old petroleum course into one on chemical engineering. His views must be influenced by his own experience in the petroleum industry, but they had a wider horizon, as chemical engineers were needed in most modern industries. However, he hoped that the Department, which was started with funds provided by the petroleum industry, would maintain its main association with that industry.

It was Oliver Wendell Holmes who said: "When a resolute young fellow steps up to that great bully, the world, and takes it boldly by the beard, he is often surprised to find that it comes off in his hand, and that it was only tied on to scare away timid adventurers." Mr Southwell said that his experience confirmed this and he felt that they all tended to try and play too safe these days. He advised them to have the courage to change if at first they did not get into the particular line of activity they desired. He also stressed the importance of good human relations as the main key to success on foreign service.

Concluding, Mr Southwell said it was important that such Societies should flourish and that if they were to survive they must keep Britain in the forefront of scientific research and in application of science to industry.

Mr G. A. Lee (*chairman of the Society*) responding to the toast reported that the Society had had a successful year and particularly asked the guests to support their magazine, the *Birmingham University Chemical Engineer*, part 2 of volume 2 of which has just been published.

Mr Lee thanked the Department and Professors F. H. Garner and F. Morton for much assistance and co-operation during the year, and Mr Southwell for his toast.

"*The Guests*"

The toast of "The Guests" was proposed by **Mr G. A. Webster** (*junior treasurer of the Society*) who said that he was sure all the guests were proud of their association with the chemical industry with which the members of the Society hoped to be associated later in life. He particularly welcomed the valuable adjunct to University training provided by the vacation courses and tendered the thanks of the students to those firms who had made their works open to them for that purpose.

Mr J. S. Parker (*refinery manager, Lobitos Oilfields Ltd.*) replying for the guests, said that in the past year, his company had acquired a comparatively large number of members or former members of the Society and he was pleased to report that they had proved very satisfactory.

Education, like petroleum, had advanced considerably in technique since the early days, and had similarly branched out into specialization. Petroleum, said Mr Parker, had developed a wide range of specialized processes and

had lately entered the domain of chemicals manufacture. Total personnel requirements of the industry had also expanded and the ratio of skilled to unskilled men had changed considerably in favour of the former. This led to an ever-increasing interest by the industry in education and its products.

Specialization in education brought its difficulties and the two parties interesting themselves in the problems which arose were the Institute of Petroleum and the Council of British Manufacturers of Petroleum Equipment. There was full co-operation and progress was being made.

PETROLEUM IN PARLIAMENT

Anglo-Iranian

In a written answer (April 3) the Minister of Fuel and Power said that the Anglo-Iranian Oil Co have never supplied and do not contemplate supplying oil to the Shanghai Power Station.

Persia Concessions

Asked if the boundaries of the 100,000 acre concession to the Anglo-Iranian Oil Company had now been demarcated on the ground, the Secretary of State for Foreign Affairs said:—

Under its 1933 Concession Agreement with the Persian Government, the Anglo-Iranian Oil Company was granted the right to select, within a given region of South-Western Persia, an area or areas not exceeding 100,000 English square miles (not acres as stated in the Question). These areas were duly selected and, as required by the terms of the Concession Agreement, were identified by maps and by the data necessary to define them. The Concession Agreement does not require these areas to be defined in any other way.

Answering a supplementary question, as to whether in view of the action of the Persian Government in regard to Anglo-Iranian Concessions, he would consult with U.S.A. in order that both countries might have a common policy over oil concessions in the Middle East, the Minister said: We are in consultation with the U.S. Government.

Persian Reply

The Persian Government's reply to our Note to them of March 14 was handed to His Majesty's Ambassador on April 8, and a copy is being made available in the Library today, said the Foreign Secretary in reply to a question on April 11, on the subject of the Persian proposals to nationalize the Anglo-Iranian Oil Co's interests in Persia. Questioned further, the Foreign Secretary said that the Government was in discussion with the United States about the general oil problem in the Middle East.

Lubricants Tests

The Minister of Supply was asked on April 9 whether, in view of the close collaboration between the authorities concerned in the U.K. and the U.S.A. for the production of standard methods of type testing of lubricating oils and hydraulic system fluids for vehicles and aircraft, he would give an assurance that no British oils for Government tenders would require to have been previously approved by an analyst of the U.S. Government.

The Minister said: No. Until adequate facilities for certain type tests are available in this country, some lubricants have to be tested in the United States.

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The **Institution of Works Managers** has published a new directory of members, for whom details are given of the positions they hold. The last directory was issued four years ago, since when the merger between the Institution of Factory Managers and the Institution of Works Managers has been consolidated. Copies from the offices of the Institution, 67-8 Chandos Place, London, W.C.2., at 10s. 6d. each.

AROUND THE BRANCHES

FAWLEY, LONDON, NORTHERN, SCOTTISH, SOUTH WALES, STANLOW, TRINIDAD

London Branch

On March 19 a meeting was held at Manson House under the chairmanship of A. J. Goodfellow, former Branch chairman, in the absence due to illness of both the chairman and vice-chairman. According to the programme Mr C. A. P. Southwell, president of the Institute, was to read a paper but at the last moment he was unfortunately unable to be present and E. C. Masterson of the Field Operations Division of the Kuwait Oil Co. Ltd., kindly took his place and lectured on "Handling Crude Oil in Kuwait."

Mr Masterson's theme was the transfer of the crude oil from the well through the gas separators, storage tanks and pipe lines to the great loading jetty at Mena-al-Ahmadi. He treated his subject from a very practical angle, describing not only the sequence of events and the equipment involved, but also the innumerable practical problems met with at each stage and the reasons for the adoption of the solutions finally worked out. The result was a talk of unusual interest to members of the industry based in London, who have many opportunities of learning how various operations in the production areas are carried out, but are relatively rarely in a position to appreciate the practical difficulties and the many technical considerations which have to be taken into account in developing the operation from a project to a "going concern."

The interest aroused by the lecturer was well shown in the lively and informative discussion which followed the paper and in the enthusiastic reception of the vote of thanks proposed by W. H. Davies. A number of members afterwards accompanied the speaker, who was the Branch's guest, for an informal dinner.

Scottish Branch

At the meeting held in Glasgow on April 5, W. McLaughlin, head of the Engineering Design Department of Messrs John Brown & Co., Ltd., Clydebank, spoke on "The efficient burning and utilization of liquid fuel in the cylinders of internal combustion engines and in the combustion chambers of water tube boilers." Chairman was Mr Robert Crichton, J.P.

Mr McLaughlin discussed the efficient burning and utilization of liquid fuels in the cylinders of internal combustion engines and in the combustion chambers of marine water tube boilers, pointing out that a situation is rapidly developing in matters relating to the world fuel supplies which will compel the utmost economy in the use of liquid fuels in order to avoid depletion of those supplies, thereby building a reserve to meet the requirements of emergency.

Not least of the economies which can be effected is the efficient use of the fuels we now possess, and the author examined minutely the combustion processes, both in internal combustion engines and in the combustion chambers of marine water tube boilers.

Dealing first with the compression ignition engine, Mr McLaughlin pointed out that fuel consumptions of 0.37 to 0.39 lb per s.h.p. per hour are readily obtainable today. He next outlined the effects of the surrounding air temperature on the oxidation rate of the fuel, and traced the progress of combustion during the period which is required when solid or airless injection is employed, the effects of efficient scavenging being also considered. The different cycle phases were then compared, and valve timing for both two-stroke and four-stroke cycle engines described in detail. He continued by comparing the

diesel cycle ideal thermal efficiency with that obtained in practice, and after discussion on fuel systems during which the operation of the control system of the fuel injection valves was described, presented a heat balance showing the heat flow in the system of an internal combustion engine. He concluded this section by a consideration of pressure charging and its effect on performance and also with a brief discussion on the burning of heavy fuel in these engines.

The speaker then drew attention to the different pressure conditions which exist in the combustion chamber of a water-tube boiler, outlining the requirements of an oil burning plant for this purpose. To operate efficiently, the oil sprayer must atomize the fuel into the finest particles, and then project this oil so that it will mix intimately with the combustion air which is entering the combustion chamber through the air register. One type of air register in use today was then described and the combustion in water tube boilers, its effect on heat transmission to the boiler generating surfaces, its effect on furnace temperature, and finally its effect on boiler efficiency was discussed at some length.

The lecture was illustrated by a number of slides, and a film was presented showing a Doxford 5-cylinder engine running at normal full power on the test-bed, in the engine works of Messrs John Brown.

South Wales Branch

The seventh meeting of the session was held at Llandarcy on March 8, 1951, at which a Symposium on Accountancy in Petroleum Refining was presented by C. A. Simpson, supported by W. E. Evans, M. E. Thomas and E. J. Jones.

Mr Southall, in the unavoidable absence of the Branch Chairman, took the Chair.

In opening the proceedings, Mr Simpson intimated that the objective was to give some idea of the organization of an accounts department of an oil company and also of some details required for a petroleum refinery. Obviously, this must be on very broad lines. He dealt generally with the organization as it existed at Llandarcy, and the chain of control from the control point, London, explaining briefly how and why the various sections of the department were split and how they linked up, giving an outline of their duties, stating that a more complete picture would be given of certain sections, such as costs, oil stocks and general, by his collaborators.

W. E. Evans dealt with the costing section, explaining the various classifications and splits in wages, direct materials, purchases, power steam and water, rents, rates and insurances etc., and further, that in all cases, for check purposes, there was a control account. He then explained how everything was broken down and given a job number. He also dealt with the building up of necessary monthly statements and in a very general way dealt with budgetary control.

M. E. Thomas followed, dealing with the oil stocks section. He outlined the method of control of movement of liquid products and the checking of quantities by physical measurement. He described briefly, the method of handling receipts of crude oil, right through refinery operations to the finished products and the ultimate balancing of inputs against outputs. Mr Thomas summarized the methods of stock keeping and referred briefly to operations in connexion with Customs and Excise.

E. J. Jones then described the operations of the general section, which in the main, co-ordinated all other sections of the accounts department in such a way that, with the co-operation of other departments, outside accounts, true cost and financial statements of process operations, process and engin-

eering expenditure were produced. He described the main types of statements which were necessary from the budgetary point of view to be produced both for local use and for general information of the directors. He discussed briefly, financial estimating for budgetary purposes.

Mr Simpson, in closing the proceedings, pointed out that the picture given was quite a small one and time did not allow a more detailed account of other sections, nor had mention been made of the various problems and difficulties which had to be overcome. He further stated that although the particulars given may be the general organization of an oil company, he would like to make it quite clear, that in this instance, it was essentially as carried out at Llandarcy.

A lively discussion followed. Amongst those who took part were Messrs Vivian, R. A. F. Lee, I. Cameron, M. Y. Muirhead, Ragione and S. Griffiths.

Vote of thanks was proposed by H. W. Murphy and seconded by T. L. Williams.

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FUEL EFFICIENCY

At the recent Conference on Industrial Fuel Efficiency at the Mansion House, London, Mr Alfred Robens, Minister of Labour, who then was Parliamentary Secretary, Ministry of Fuel and Power, spoke on the part played by the Ministry of Fuel and Power's Mobile Testing Service.

Mr Robens said: "A London firm using £30,000 worth of fuel oil per annum decided to use the Mobile Testing Unit Service and it was shown that the fuel consumption could be reduced by about 40 per cent. This would show a saving of over £12,000 per annum, £10,000 of which was recoverable without any capital expenditure.

SYRIAN CONCESSION ABANDONED

It is announced that the Syria Petroleum Company—a member of the I.P.C. group and identical with that company in shareholding and control—has notified the Syrian Government of its abandonment of its concession. This will become effective in August of the present year. The abandoned wells, together with geological and drilling information will be handed to Government representatives.

The concession thus terminating was obtained from the Damascus Government in February, 1938, and ratified by the legislative body effective at the time in March, 1940. The concession superseded a number of exploration permits which the company had previously held and under which drilling had been carried out at Jebel Bishri, Djibissa, Chembe and Derro.

Under the concession, drilling was extended to promising structures at Cherrife and Dubayat.

After the war, drilling was resumed as early as possible, and extensive workshop and transport depots were established in the country. Wells, which unfortunately proved dry, were drilled at Baflum, Dola'a, Abba, Ghouna, Djibissa, and Gubeibe. In spite of all efforts, however, and the carrying of the wells to depths exceeding 10,000 ft, no commercial prospects have been discovered.

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ESSO PETROLEUM COMPANY

Esso Petroleum Company Ltd. is the name by which the Anglo-American Oil Company Ltd. is now to be known. This announcement, made by the Board of Directors of the company, was put into operation on April 6.

EXHIBITION OF THE PETROLEUM INDUSTRY

The Exhibition of the Petroleum Industry which is touring Great Britain was opened at the Royal School of Mines, London, on April 5 by Sir Henry Tizard, F.R.S. Sponsored by the Shell Petroleum Co. Ltd. and the Anglo-Iranian Oil Co. Ltd., the opening ceremony was performed under the auspices of the Institute of Petroleum and the Chair was taken by the president, Mr C. A. P. Southwell, M.C.

More than 300 members and guests were present at the opening ceremony and subsequently examined the exhibits.

Mr C. A. P. Southwell said that the petroleum industry called for great enterprise, ingenuity, invention, and research. It embraced most sciences and in many cases transferred theory into practice. Petroleum was the largest single factor in international trade and was directly responsible for vast improvements in the world's standard of living. It provided nearly one-third of the world's energy.

The petroleum industry should do more to ensure that its work was understood and appreciated in the universities and by the general public. The aim of the exhibition was to explain what the petroleum industry did and how it did it.

Asking Sir Henry Tizard to open the exhibition, Mr Southwell also expressed the thanks of the Institute to the Rector and Professors of the Imperial College for enabling the exhibition to be held in their premises.

Sir Henry Tizard, G.C.B., F.R.S., said that without the application of science to industry Great Britain would be incapable of maintaining its present population. The exhibition showed clearly that no industry surpassed the petroleum industry in the application of science, and its development had been a romance of science as well as of adventure.

Thirty years ago the knowledge of detonation in internal combustion engines was meagre and in consequence engine performance was limited. Today the exacting fuel requirements of the engine designer are continuously met by the oil companies. At the same time the price has kept remarkably steady. When he (Sir Henry) first bought petrol forty years ago the price was 1s. 2d. per gallon. Today, excluding tax, it is 1s. 6d. per gallon, an increase of some 30 per cent only, although costs of wages and equipment must have increased by four or five times.

Viewing the exhibits. Left to right: The Hon. F. J. Hopwood, F. A. C. Guepin, Sir Henry Tizard, J. H. Loudon, and Dr G. M. Lees. (A Shell photo)

Demand for petroleum has not been limited to petrol. In 1931 he predicted that within ten years most heavy road vehicles would be fitted with compression ignition engines using heavy fuels. That prophecy was fulfilled; the oil

companies had again met the challenge. The industry now had a further challenge to provide fuels for aircraft turbine engines and he had no doubt that it would be successful.

The exhibition would show how the success of the petroleum industry had been achieved by the progressive application of science, and the immense influence which the industry had on other industries.

Declaring the exhibition formally open, Sir Henry said that he hoped it would inspire future leaders of the industry.

The Exhibition

The exhibition was arranged on a logical basis and the visitor first saw a large world map showing the position of all producing oilfields. Following this were area displays of the major producing centres. These displays included photographs, geological sections, production data and detailed location maps.

Particular interest was shown in the Middle East and an excellent general map clearly showed the general relationship of the various fields, refineries and pipelines.

In regard to the U.K., some interesting figures of drilling activity in the search for oil were shown on the panels. For example, in the Eakring area 335 boreholes, of which 232 are producing oil, were drilled to a total depth of 794,846 feet; in the Scottish area 7 holes totalled 18,352 feet; in Eskdale 6 holes totalled 19,674 feet; in Formby there were 5 deep wells aggregating 19,228 feet and 49 shallow (including producers) boreholes totalling 14,448 feet; and on the South coast 8 deep wells totalling 25,123 feet and 22 shallow information wells to 4,598 feet.

In this section there were also wall displays illustrating in particular geophysical methods of locating oil deposits. The use of aerial surveying and the construction of aerial maps was shown.

Refining and the manufacture of products was illustrated by the use of flow charts on which samples of the principal products were placed at appropriate points. Models of plant were on show and included some drilling equipment.

Transport and distribution by sea and land was the subject of world maps.

Finally, the work of the Petroleum Information Bureau was displayed on two panels and there was a display of literature produced by the British petroleum companies, the British press and the Institute of Petroleum.

The Exhibition remained in London until April 21 and will be in the provinces as follows: Royal Technical College, Glasgow, May 4 to 19; Department of Mining and Geology, Leeds, June 20 to July 6; Engineering Department, Cambridge, July 16 to 28.

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NEW PLANT FOR BRITISH REFINERIES

Very considerable movements of heavy engineering equipment will be carried out during the coming months in connexion with the Anglo-Iranian Oil Co's programme of expanding its refineries in Great Britain.

These include the transport of a steel column measuring 80 feet in length and 16 feet in diameter, weighing 120 tons, from the boiler works of Marshall & Anderson Ltd, at Motherwell, to the Grangemouth refinery of Scottish Oils Ltd. The route involves carriage over 30 miles of road (since the column is too large to travel by rail) and special bogies are being designed for it. The new column will form part of the catalytic cracking plant being installed at Grangemouth.

The same manufacturers are also supplying a column measuring 76 feet by 16 feet to Llandarcy refinery, South Wales. It will be moved by road from Motherwell to Glasgow, and thence towed down to Swansea by water, via the Clyde and west coast, in a manner similar to that adopted many years ago when Cleopatra's needle was brought to London from Egypt.

CADMAN MEMORIAL LECTURE

The Council of the Institute of Petroleum have invited Dr Robert E. Wilson, Chairman of the Board of the Standard Oil Company (Indiana), to deliver the third Cadman Memorial Lecture on Thursday, June 21, at the Royal Institution, 21 Albermarle Street, London, W.1.

The meeting will commence at 4.30 p.m., and at the conclusion of the lecture, the President of the Institute of Petroleum, Mr C. A. P. Southwell, M.C., will present the Cadman Medal to Dr Wilson.

The title of the address will be:—

"Management and Research in the Petroleum Industry."

Dr Robert E. Wilson was born in Pennslyvania, and is a graduate of the Massachusetts Institute of Technology, of which he is now a member of the board.

He began his career as a research associate at the Massachusetts Institute of Technology, and later became a director of research there.

In 1922 he became assistant director of research at the Whiting Refinery of the Standard Oil Company (Indiana). Later he became a director and vice-president of that company, and in 1945 was appointed to the chairmanship of the board.

During the war Dr Wilson was chairman of the Committee on Petroleum Economics of the Petroleum Industry War Council.

Dr Wilson is a director of the Chase National Bank, and of the First National Bank of Chicago, and a member of the National Petroleum Council.

As a scientist he has published some eighty technical papers, and has over ninety patents in his name.

He received the Chemical Industry Medal in 1939, and the Perkins Medal in 1949.

★ ★ ★

SIR JOHN CASS COLLEGE

The report of the Sir John Cass College for the Session 1949-50 shows that for the course of 20 lectures on General Technology of Petroleum 185 students were enrolled, for the course of 6 lectures on Petroleum Fuels there were 133 students, and for the 6 lectures on Special Products for Petroleum, the number of students was 138.

The resignation of Mr J. A. Oriel from the chairmanship of the Petroleum Consultative Committee was received with regret and he was succeeded by Colonel S. J. M. Auld, O.B.E., M.C., who was also elected to the Board of Governors. Dr E. J. Boorman, chief chemist to the Esso Petroleum Co Ltd, joined the Consultative Committee on the resignation of Colonel D. S. Paul.

★ ★ ★

Process Control Instruments. A new range of process control instruments has been developed by Evershed and Vignoles Ltd., London, W.4. They operate on the Evershed electronic repeater system and include a process controller suitable for installation in dangerous atmosphere, an electro-pneumatic relay and the "Rollflow" transmitting type of flowmeter.

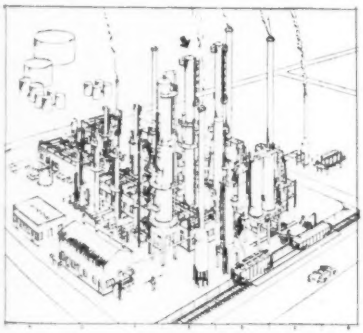
COMPLETE COMBINATION PLANT FOR CANADIAN REFINERY

An advanced example of combination processing of petroleum is being erected for the British American Oil Co. Ltd. at Edmonton, Alberta.

The refinery, pictured in the perspective drawing below, is a complete combination plant operating off one central control room. Processing equipment includes crude distillation, delayed coking, thermal and fluid catalytic cracking, gasoline stabilizing, light ends fractionating, and light oils treating. The first of its kind, this refinery will process two million barrels of crude each year brought from Redwater by pipeline.

Key to the processing sequence is stated by the designers, the M. W. Kellogg Co., to be in the segregation of light and heavy feeds stock for thermal and catalytic cracking, respectively. This operation is handled in a unique combination bubble tower which fractionates effluent from both the thermal cracker and the delayed coker as well as light cycle oil from the fluid catalyser.

Light ends off the top of this tower go to the vapour recovery group which processes all refinery gaseous products. The overhead liquid product is a blend of coker and thermally cracked gasoline which is stabilized separately from the catalytically cracked gasoline. A mixture of light cycle oil from the catalyser and light gas oil from the coker is withdrawn from the upper section for thermal cracker feed stock. Below this, heavy gas oil is taken off as catalytic cracker feed. The bottom product is tar.



Perspective drawing of new refinery at Edmonton. Arrow indicates combination bubble tower.

Principal products, therefore, from the refinery are straight-run gasoline from the crude unit, a mixture of coker and thermally cracked gasoline from the combination tower, and catalytically cracked gasoline from the cat fractionator. These gasoline streams are separately stabilized and then blended in desired proportions. Seasonal vapour pressure requirements are fulfilled in the final step. The plant is being erected by The Canadian Kellogg Co. Ltd.

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A.P.I. TABLES AND SPECTRA DATA

The Carnegie Institute of Technology will make all future distribution of infrared, ultraviolet, mass and Raman spectral data, as well as tables of physical and thermodynamic properties of hydrocarbons, which have been made available as a result of the activities of the A.P.I. fundamental research projects.

Tables and spectra data may be ordered only as complete sets except that additional data may be secured as they are published.

Orders should be addressed to the Carnegie Institute of Technology (attention of Dr Frederick D. Rossini), Pittsburgh 13, Pennsylvania, U.S.A.

★ ★ ★

"The Shell," a new strip cartoon magazine for motor mechanics, introduces Olley Hand, the garage detective and Dopey Dan, the "garage drip." There are also tips on car maintenance.

SHELL-MEX'S NEW TELEPHONE SYSTEM

A new telephone installation was recently opened at Shell-Mex House, London. The main switchboard room houses a suite of type 1A multiple switchboards, to which are connected 75 exchange lines, 49 private wires and 459 extensions. Fourteen operators handle calls, while a supervisor deals with queries.

The new installation occupies the space on the Embankment floor level which was used during the war as the teleprinter room of the Petroleum Board.

At the opening of the new Shell-Mex House telephone room: Col A. Prodgers, Brigadier L. H. Harris, C.B.E., Col J. Gardiner, and R. J. P. Harvey, C.B., all of the G.P.O., with E. E. Fidler and L. C. P. Scaife, respectively communications manager and establishment manager of Shell-Mex and B.P., and B. L. Barnett, C.B., M.C., deputy director-general, G.P.O.

★ ★ ★

"VACUUM"

A new quarterly journal devoted to developments in vacuum research and engineering is now being published. Vol. 1 No. 1 of *Vacuum*, dated January 1951, contains contributions by Prof E. N. da C. Andrade on "The Services of Vacuum," Dr R. J. C. Harris "A Review of Laboratory Freeze-Drying with Particular Reference to Viruses" and R. Holland, "The Production, Properties and Uses of Thin Films Condensed in Vacuo." The journal also contains correspondence, book reviews, and abstracts.

Copies of *Vacuum* are available on a subscription basis from Messrs. W. Edwards & Co (London) Ltd., Worsley Bridge Road, London, S.E.26, the price being 25s. British Isles, and 30s. abroad.

HYDRAULIC SYSTEMS

A new 103-page booklet entitled "Hydraulic Systems and Oils" is available, free of charge, from Shell-Mex and B.P. Ltd., Shell-Mex House, London, W.C.2 in the U.K.

General divisions of the booklet are hydrostatic systems—pumps; hydrostatic systems—driven units and their control; hydrostatic systems—applications; hydro-kinetic transmissions; hydraulic seals; hydraulic oils; Shell oils for industrial hydraulic machinery.

There are 44 well-produced figures and an appendix includes pressure viscosity curves for various hydraulic oils, relative density/pressure curves for water and typical hydraulic oils and tables for the conversion of viscosity figures.

THE INSTITUTE OF PETROLEUM BROCHURE

As a means of bringing to public notice the work of the Institute of Petroleum, and as a means of attracting new membership, a Brochure was published in 1947. This publication was given a wide circulation and a second edition was published in 1948.

In 1950 it was decided that a further reprint was necessary, and that a complete revison was desirable. The layout was modified and the script re-written, and a message from the President included in the form of a foreword.

To secure attractiveness and to make the Brochure distinctive from other Institute publications binding was arranged on the short side and the cover design was arranged for colour reproduction.

The Brochure provides to Members full information on the history and organization of their Institute; to non-Members, who have the required qualifications for membership, full information on the privileges to be obtained from membership, the cost of membership and the method to secure membership; to others whose only interest may be in a knowledge of the only scientific society in the United Kingdom specializing in all aspects of the petroleum industry, full information on that subject.

A copy of the Brochure is being forwarded to all Institute Members, and is being made available to Branch Members. As the major aim of the Brochure is to attract new members, it will be appreciated if Members and Branch Members who do not desire to retain their copies, would pass them on to a likely candidate for membership.

Copies will be made available to the petroleum industry and will be available on the Institute's stand at the World Petroleum Congress in Holland. It is possible that in the distribution an interested firm or individual may be overlooked. In this case, application for a copy or copies should be made to the General Secretary of the Institute.

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PRICE INCREASES FOR MOTOR SPIRIT

The Ministry of Fuel and Power announced on April 10 increases of $4\frac{1}{2}$d per gallon in the maximum prices of motor spirit, diesel oil for road vehicles (DERV), aviation spirit, white spirit, and benzole and certain allied products, to cover the additional Customs and Excise duties now imposed. The new maximum prices of motor spirit at the pump is 3/6 per gallon in the inner zone, $3/6\frac{1}{4}$ per gallon in the outer zone and $3/6\frac{1}{2}$ per gallon in the general zone. The inner zones are approximately 15 miles from the main importing centres, the outer zones approximately between 15 and 40 miles from the main importing centres and the general zones cover the remaining territory with exceptions such as North-West Scotland where the maximum price is slightly higher than in the general zones. The main importing centres are London, Bristol, Glasgow, Grangemouth, Hull, Liverpool, Manchester, Newcastle, Southampton, Swansea and Cardiff.

The maximum prices of certain grades of benzole and of other products including naphthas, xylole and toluene, are governed by Regulation. An amending Regulation which came into force at the same time authorizes the increase of $4\frac{1}{2}$d per gallon in the maximum prices of these products.

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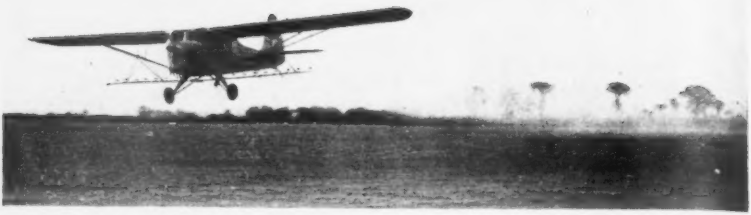
Laboratory Chemicals. A new 116 page price list (p. 1847) has been issued by W. & J. George & Becker of London and Birmingham. It lists upwards of 5000 items and covers chemicals, Nivoc analytical reagents, standard solutions and stains.



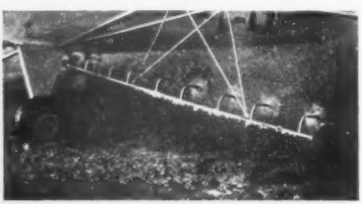
Auster Aiglet aircraft in flight demonstrating low-altitude spraying technique *Shell photos*

AERIAL CROP SPRAYING

During the last five years the Agricultural Research and Development organization of the Royal Dutch Shell Group has investigated two lines of development in aerial crop spraying. These concerned spraying equipment for use on all types of aircraft and insecticides with efficient atomizing properties.

After extensive experiments with helicopters, these were discarded for the present mainly on account of cost. Through the interest of Prince Bernhard of the Netherlands, who loaned his Stinson Vigilant for the purpose, trials were made with this fixed-wing aircraft. As a result of further development spraying equipment was evolved and incorporated a standard nozzle with an atomizing capacity independent of the properties of the spray liquid and giving a constant performance irrespective of aircraft speed. A row of these nozzles fitted to a spray bar beneath the aircraft gives uniform distribution of spray. The spray liquid is carried in a 48-gallon tank in the aircraft, and is pumped to the nozzles by a pump operated by means of a retractable airscrew beneath the aircraft. The effectiveness of this method of spray distribution was amply shown at a recent demonstration at Boston.

Late in 1949 Aerial Spraying Contractors Ltd. was formed at Boston, Lincolnshire, and has several Auster Aiglet aircraft fitted with the new spray equipment. During October 1950 three Aiglets fitted with this spray equipment were used to spray 17,000 acres of cotton in the Sudan against cotton jussid, an insect which lives and feeds on the underside of the leaves. It was stated that this work was completed at an average of nearly 70 acres per flying hour, the fields varying in size from 5 to 200 acres. The deposit per acre varied from 2 to 4 gallons of liquid and height of application was from 6 to 15 feet, depending on crop and climatic conditions.



Ground testing of spray bar operations

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Kuwait Crude. Production of crude oil in Kuwait for the month of February, 1951, amounted to 1,357,545 tons. Total production for the period January 1 to February 28, 1951, was 3,125,353 tons.

POWER PLANTS FOR OILFIELDS

Three contracts for power plant equipment for the Shell oilfields are nearing completion. The first of these, worth approximately £600,000, was placed with the English Electric Company Ltd, Rugby, and covered eight 7,500 kW steam-driven turbo-generating sets and all ancillary equipment.

Four of these turbo sets have already been shipped to Indonesia and are now being installed. They will provide power and light to the refinery, camp settlement, and adjacent oilfields in Balikpapan, where an entirely new power station will be completed by the middle of 1951 to replace the one destroyed by the Japanese.

The remaining four sets have been shipped to Punta Cardon on the Paraguana peninsula of Venezuela where the new refinery has been in operation since February 1949. When completed, this refinery will have a throughput of 140,000 b.d. The sets are being used in the 30,000-kW power station to supply light and power for the refinery and the self-contained township erected nearby to accommodate employees and their families.

The second contract, worth about £650,000, covering the supply of two complete steam-raising plants for the above-mentioned refineries, was awarded to Babcock & Wilcox Ltd. These plants have been designed to provide steam for driving the new turbo-generators and for supplying process steam for the refineries. The boilers can be fuelled by either fuel oil or natural or refinery gas, and each is capable of producing 45,000 kilograms per hour (normal rate) steam pressure, 40.5 kilograms per square centimetre at a temperature of 425°C.

The third contract for seventeen 500 kW gas-engine-driven generator sets costing about £350,000 was awarded to the National Gas and Oil Engine Company Ltd., of Ashton-under-Lyne. These generating sets have been shipped to Venezuela, Colombia, and Seria, British Borneo.

Fuelled economically by natural gas from the oilfields, the engines are of the BARG 8 type, 740 h.p. and are designed to operate day and night at their full output in a tropical climate. All the necessary ancillary equipment has been provided for lubrication, cooling, and automatic control.

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FIREPROOF PAINTS AND VARNISHES

A meeting to discuss matters in connexion with paints and varnishes will take place at the Maison de la Chimie, Paris, from June 3-6. Those who wish to present papers are invited to apply to the Federation d'associations de Techniciens des Industries des Peintures, Vernis, Emaux et Encres d'Imprimerie de l'Europe Continentale, 28 Rue Saint Dominique, Paris, 7.

Concurrently with the meeting, an exhibition will be held of new techniques in the paints, varnish, and printing inks industries.

★ ★ ★

Monel. The use of Monel in the pickling of steel is described in a well-produced 32-page booklet published by Henry Wiggin & Co. Ltd., Wiggin Street, Birmingham, 16. The booklet is illustrated by 21 diagrams and photographs.

Lake & Elliot Ltd. have recently concluded an agreement with the Key Company of U.S.A. and are to manufacture "Key" refinery fittings in the U.K. The terms of the agreement include the interchange of technical information.

Labitems. Under this title the Emil Greiner Co., 20-26 N. Moore St., New York 13, N.Y., are now issuing a magazine containing illustrations and descriptions of new laboratory equipment. No. 1 is dated January 1951 and future issues will appear from time to time.

LABOUR STATISTICS FOR THE U.K. PETROLEUM REFINING INDUSTRY

The following figures are taken from the March 1951 issue of the *Ministry of Labour Gazette*. The heading under which they have been listed therein is "Mineral Oil Refining" a sub-group within the division of "Chemicals and Allied Trades."

The tables from which these figures are quoted cover about 20 industries (manufacturing and other) grouped into about 130 classes.

Figures in bold type are the averages for all the industries covered by the tables.

	Men (21 and over)	Youths and Boys	Women (18 and over)	Girls	All Workers
No. of wage-earners covered by remuneration statistics	11,401	665	592	11	12,669
Average earnings in last pay-week in October, 1950	161 8 **150 5**	70 1 **63 9**	92 7 **82 7**	—	153 7 **128 0**
Average number of hours worked in this pay-week	48.6 **47.6**	45.3 **44.4**	46.4 **42.0**	—	48.3 **46.1**
Average hourly earnings in this pay-week (pence)	39.9 **37.9**	18.6 **17.2**	23.9 **23.6**	—	38.2 **33.3**
			Males	Females	
Numbers employed (January, 1951)			32,800	6,500	39,300
Numbers unemployed (at February 12, 1951)			207	51	258
Labour turnover rate (5 weeks ended December 30, 1950)					
No. of engagements per 100 employed			1.8 **2.2**	1.7 **2.8**	1.8 **2.4**
No. of discharges and other losses per 100 employed ...			1.2 **2.1**	1.6 **3.8**	1·2 **2.7**

★ ★ ★

ICELAND'S SUBMARINE PIPELINE

The first submarine pipeline to be laid off the Icelandic coast recently came into operation at Shell's oil installation at Skerjafjord in south-west Iceland. The new line, 8 inches in diameter and about 800 feet long, replaces a 23-year-old floating pipeline, used for the discharge of petroleum products from ocean tankers which are prevented from approaching the oil pier on account of shallow water. The Skerjafjord installation supplies oil products to Reykjavik, the capital.

CRUDE OIL
COMPANY PRODUCTION
1951

February	
Anglo-Iranian Oil Co.	tons
Persia	2,579,000
March	
British Controlled Oilfields.	brl
Venezuela:	
Western area	12,047
Central area	16,962
Trinidad Petroleum Development Co.	251, 815
Kern Oil Co.	
California	113,233
Trinidad	54,401

★ ★ ★

APPOINTMENTS VACANT

Esso Petroleum Company Limited requires **Mechanical Engineers** for its new Refinery now under construction at Fawley, Southampton. Successful applicants will be required to act in the capacity of one of the posts listed below:

Mechanical General Foreman to supervise maintenance of all mechanical plant, responsible for planned maintenance of all multi-stage pumps, etc., together with the operation of the machine shop. Candidate must have had at least five years of practical experience supervising similar work on heavy industrial plant on continuous process. The work will entail the direction of the activities of this department and the control of mechanical fitters working on the plants and in the workshops. Preference will be given to candidate with some Drawing Office experience.

A house for rental will be available at an early date if required by the successful candidate for this part.

Planning & Methods Engineer to be responsible for the production of programme to cover all plant maintenance and construction work, taking into account economic utilization of manpower and materials, and availability of maintenance equipment. Will also be required to operate Cost Control Section and conduct work methods studies to increase work efficiency. Candidates should have a degree in Mechanical Engineering. Similar experience in heavy industry and some design or Drawing Office experience is desirable.

Assistant Supervisor of the Utilities Generation Division. Candidates should have a good honours degree in Engineering. Preference will be given to those with experience in steam generation and distribution and boiler feed water treatment.

Inspection Engineer for the Plant Inspection Department. The work involves the inspection of all Refinery plant and equipment and study of corrosion and erosion problems and a knowledge of metallurgy would be an advantage. Candidates must have a Mechanical Engineering degree and at least two years' workshop training. Preference will be given to men who have had previous experience in the inspection of Oil refining and/or heavy chemical plants.

The positions offered are pensionable. Applications should be forwarded to the Employee Relations Superintendent, Esso Petroleum Company Ltd., Fawley, Southampton, stating age and details of qualifications and experience, together with present salary and salary expected.

Esso Petroleum Company Ltd., Refinery Dept., Fawley, Southampton, require **Chemists** and **Chemical Engineers** with good honours degrees and if possible with experience in the Petroleum or allied industries. Applications giving details of experience, qualifications, age and salary expected should be sent to the Employee Relations Superintendent at the above address.

Esso Petroleum Company Ltd., Refinery Dept., Fawley, Southampton, have a vacancy in the Planning Section of the Technical Service Department at their new Refinery for a graduate in Chemistry and/or Mathematics. Work involves the planning and scheduling of operations for the process units. The post is pensionable. Applications giving details of age, qualifications, experience and salary required should be sent to the Employee Relations Superintendent at the above address.

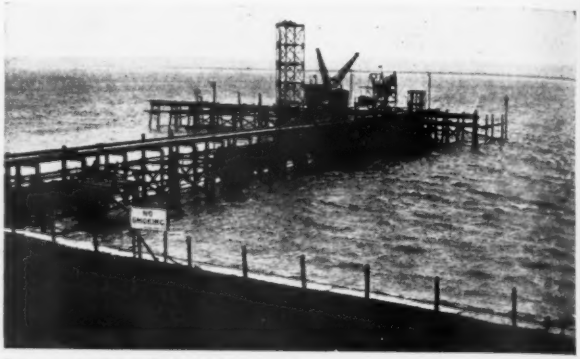
Young **Technical Assistant** required by major Aircraft-Accessory Manufacturing Firm in S.W. England. Applicants must have a good working knowledge of lubricating oils and hydraulic fuels, together with methods of tests. Ability to develop a small section of a Laboratory for analysis and test is essential. Salary will be commensurate with qualifications and experience. Applicants should write, giving full particulars of age, experience and salary required, to Box No. 1062.

NEW OIL JETTY IN THAMES ESTUARY

Now under construction in the Thames Estuary is a new oil jetty, designed to accommodate tankers of up to 38,000 d.w.t., which will be used in the conveying of crude oil to and refined products from the Shell Haven refinery.

Due to be completed in about 12 months time, the jetty will cost £300,000. Its construction method involves a series of reinforced concrete cylinders sunk into the river bed by heavy weights, with pre-stressed pre-cast concrete used for beams and fenders. The fenders themselves are of a horizontal suspended type, based on a patent by Professor A. L. L. Baker.

The jetty will be L-shaped, the approach being 414 feet long and 23 feet wide and the head 240 feet long and 40 feet wide.



Framework of the £300,000 jetty under construction at Thames Haven. [Shell photo

Illustration of Analytical Laboratory Rolls Royce, Derby, where the use of Mil apparatus and thermometers m the high degree of quality and accur demanded in their exacting research general laboratory work.

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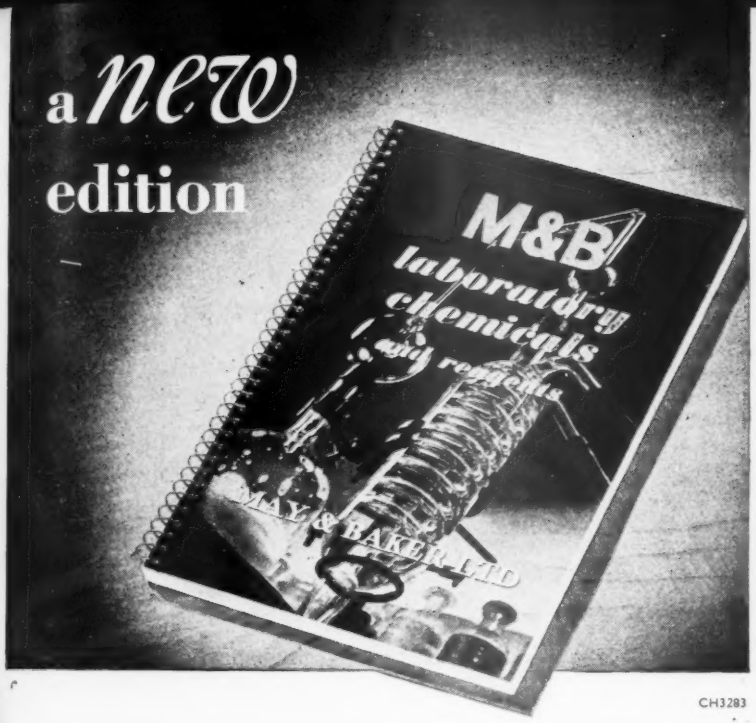

CH3283

This valuable reference book is now available in a revised and expanded edition. Containing a complete list of M&B Laboratory Chemicals & Reagents, the brochure has been augmented by the inclusion of 28 chemicals recently added to the range.

All the standards of purity have undergone thorough review, the limits of impurity have in many cases been made more stringent, and further tests have been included where it was felt such information would prove useful.

No laboratory should be without this brochure. If you have not already received your copy, "M&B Laboratory Chemicals & Reagents" will gladly be sent on request.

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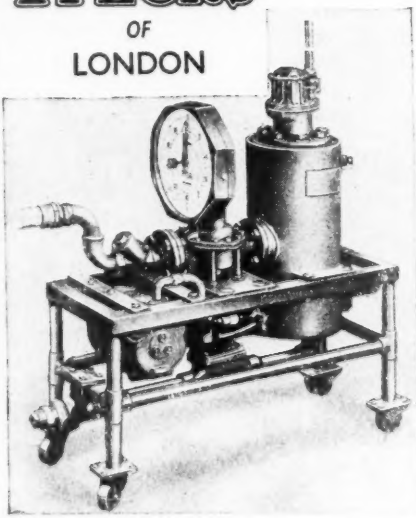

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Illustration shows Motor-driven Portable Unit with Air Elimination Device

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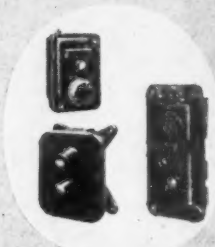
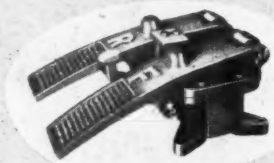
• PUSHBUTTON SWITCHES •

16-POINT CONTROL STATION



2-POINT START/STOP SWITCHES



PEDAL SWITCH

• RANGE

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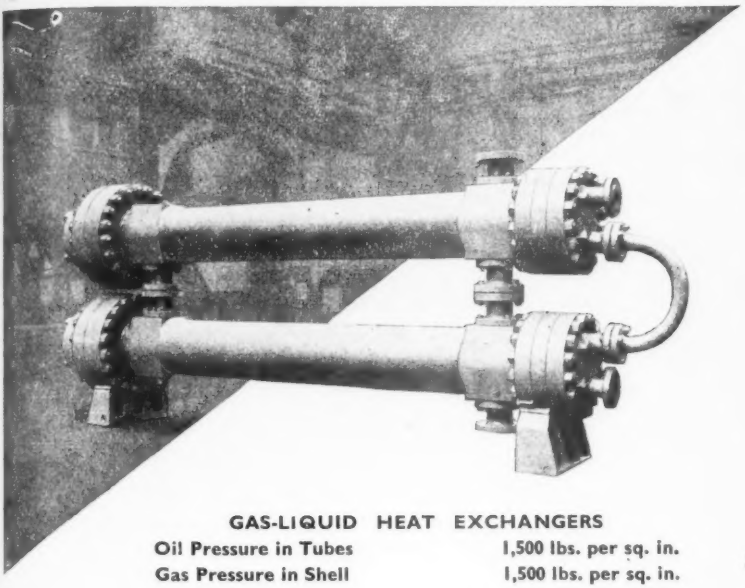

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Gas Pressure in Shell	**1,500 lbs. per sq. in.**

The Shells of these Units consist of hollow forgings, the covers for the Shell and Floating End and the Liquid Channel being of Cast Steel.

The two Units form part of a battery of eight similar Units supplied to the Anglo-Iranian Oil Co. Ltd., for service in the AGHA JARI Field.

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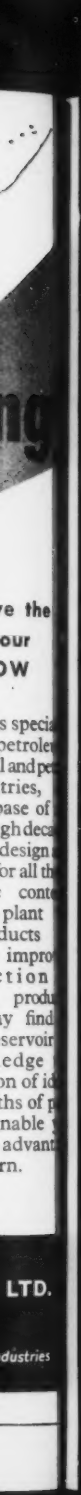

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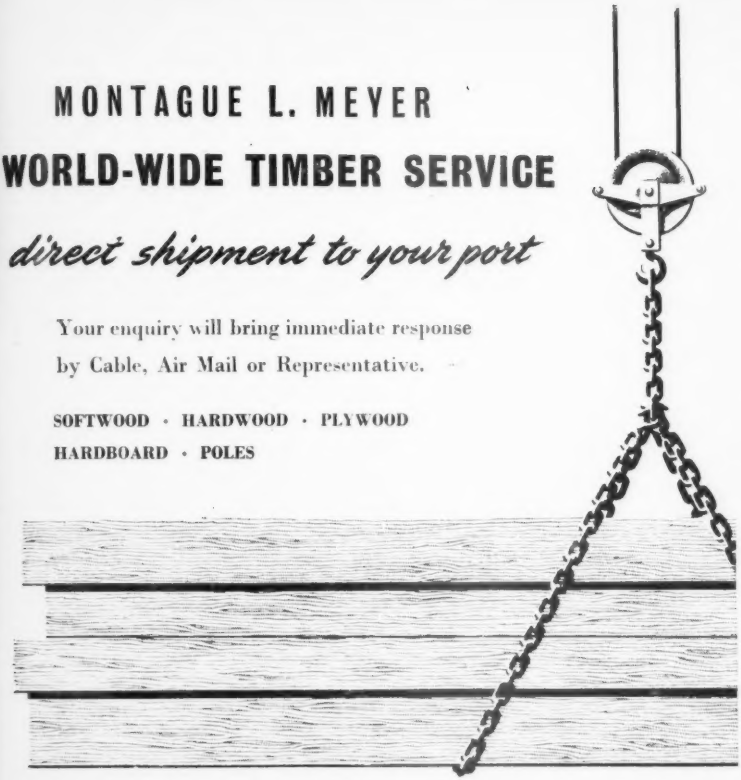

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